Maplewood, Minnesota:

Wetland and Shoreland Regulations for Wetlands Adjacent Lakes

(Capstone Project)

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Executive Summary

This Capstone Project was designed to research wetlands adjacent lakes in Maplewood, Minnesota, their current regulation, and their differences compared to freestanding wetlands in order to answer community and city concerns about the regulation of wetlands adjacent lakes separately from freestanding wetlands as part of the city's shoreland ordinance.

Five lakes in Maplewood - Beaver Lake, Kohlman Lake, Lake Oehrline, Spoon Lake, and Wakefield Lake - have wetlands in the form of shallow open waters, seasonally or permanently flowed shallow marshes, seasonally flooded swamps, or saturated meadows adjacent to them that are connected to the lakes or part of the lakes' edge. Healthy wetlands provide important ecological functions, wildlife habitat, water quality protection, and social and economic benefits. Regulators are concerned about the widths of and activity restrictions within the buffers of wetlands adjacent lakes to preserve the integrity of the wetlands and lakes and still cater to the needs of the property owners who have these wetlands adjacent to or on their properties. The city of Maplewood currently regulates wetlands adjacent lakes less strictly than freestanding wetlands through reduced minimum buffer width requirements in temporary sunset provisions in the wetland ordinance. However, there is concern that these wetlands adjacent lakes may degrade due to human activity and that the ecology, wildlife, water quality, and social and economic functions of the lakes and adjacent wetlands may be negatively affected if the buffers are not regulated as strictly as for freestanding wetlands.

Three of the five lakes with adjacent wetlands have residential areas: Beaver Lake, Lake Oehrline, and Wakefield Lake. Limited citizen input has been collected from these areas through questionnaires. Generally, the citizen input regarding the regulation of the wetlands adjacent lakes indicates concerns for water quality and wildlife protection, but opinions among residents

are split about making current buffers requirements more stringent. The questionnaire responses also indicate the need to better educate affected residents. The citizens did show interest in having pamphlets, workshops, or other educational tools available to them to create healthy shorelines and wetlands. However, they did not want their activities on and access to the lakes from their shoreland properties to be restricted too severely. The property owners feel the importance of healthy wetlands based on ecology, wildlife, water quality, and economic and social aspects, but foremost, they want to be able to do what they feel is appropriate for their way of life, before they consider the health of the wetlands.

There are differences in ecological, wildlife, water quality, and social and economic functions between wetlands adjacent lakes and freestanding wetlands. The ecosystems of wetlands adjacent lakes have adapted to being connected to surface waters and are more stable, while freestanding wetlands regularly undergo rapid changes in abiotic conditions, which results in frequent changes in the biotic community. Freestanding wetlands provide unique breeding and habitat grounds for many species that have adapted to the frequent and often rapid changes in abiotic conditions. Wetlands adjacent lakes are similarly important habitats for various species, but unlike freestanding wetlands, they provide habitat for fish and other aquatic species of the lakes. In terms of water quality, the natural vegetation buffers around wetlands filter out sediments, excess nutrients, and other pollutants. For wetlands adjacent lakes, these buffers protect the lakes as well. Freestanding wetlands themselves also filter out some pollutants and moderate water flow to permit the settlement of sediments. In contrast, wetlands adjacent lakes protect the lake’s shoreline from erosion, and their vegetation takes up nutrients and other pollutants and intercepts some of the sediment before entering the lakes’ open water. Both types of wetlands have important social and economic functions and benefits, but the main difference

is that the lakes and surrounding shorelands are valued and used primarily for water- oriented recreational purposes that require access to the shorelines, wetlands, and lakes.

Based upon ecological, wildlife, and water quality aspects, wetlands adjacent lakes should be regulated just as strictly as freestanding wetlands, as all the positive benefits of having a healthy ecological and wildlife system and good water quality are the same for both types of wetlands, even though their functions may differ. Based solely on social and economic aspects, particularly recreational uses and value, less stringent buffer requirements would be justified. However, a decline in water quality, ecology, and wildlife due to recreational uses and other human activities will greatly diminish recreational uses and value. If buffer widths and restrictions are reduced, the ecology, wildlife, and water quality will be negatively impacted, which in turn, will decrease the quality of the wetlands and lakes and, along with it, the social, economic, and recreational use and value. Thus, wetlands adjacent lakes should be regulated just as strictly as freestanding wetlands.

In accordance with these recommendations, minimum buffers width requirements in the shoreland ordinance should be set to 100 ft and 75 ft for Manage A and Manage B wetlands adjacent lakes, respectively, which are the same minimum buffer widths required for the corresponding types of freestanding wetlands. Additionally, the current activity restrictions and other buffer requirements outlined in the wetland ordinance should be taken over in the shoreland ordinance. These provisions provide a reasonable balance between preservation and uses, and ensure that most desired shoreland property uses are possible even with greater buffer widths. For the shoreland ordinance update process, it is important to gather more representative citizen input and promote the active participation of affected residents, both in the public policy process and in the shoreland and wetland conservation process.

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1.0 Introduction

This Capstone Project was conducted by a team of four students from the University of Maryland University College (UMUC) for the city of Maplewood, Minnesota (MN), addressing the city's ongoing wetland-shoreland debate as it relates to wetlands adjacent lakes and their regulation. Maplewood is doing a lot to protect its valuable natural resources, which include numerous wetlands and lakes. Central to the protection of these resources are the city's wetland and shoreland ordinances. Shoreland properties with wetlands adjacent lakes are affected by both of these, often conflicting, regulations. Maplewood has five lakes with adjacent wetlands, three of which have residential neighborhoods.

The city has updated its wetland ordinance last in 2009. During the update process, residents have pointed out the conflicts surrounding the regulation of wetlands adjacent lakes. Further, they argued for less restrictive buffer requirements for these wetlands compared to freestanding wetlands, as the lakes and shorelands are used and valued for recreational opportunities. The city has acknowledged that wetlands adjacent lakes should be viewed as part of the overall lake system and thus ultimately be regulated through the shoreland ordinance rather than the wetland ordinance. The Minnesota Department of Natural Resources (MN DNR) is currently working on updating Minnesota statewide shoreland rules. Required to meet or exceed these statewide standards, the city will have to update its shoreland ordinance accordingly once the rules have been finalized. At this time, the city plans to include the regulation of wetlands adjacent lakes in the ordinance.

Until the shoreland ordinance is updated, Maplewood has created a sunset provision for the regulation of wetlands adjacent lakes in the wetland ordinance, which expires either by the end of 2012 or when a new shoreland ordinance is passed, whichever comes first. Addressing the citizens' argument for less stringent buffer requirements, these provisions require reduced buffer widths for wetlands adjacent lakes compared to freestanding ones. Although wetlands adjacent lakes are regulated differently through these temporary provisions, it is necessary to determine whether this is indeed the best way to regulate these wetlands permanently in the updated shoreland ordinance. This project assesses whether wetlands adjacent lakes should be regulated differently, i.e., less stringent, than or the same as freestanding wetlands, and provides recommendations for updating the shoreland ordinance accordingly.

This report describes the types, locations, importance, and current regulation of wetlands adjacent lakes in Maplewood; evaluates input received from citizens who live on property with wetlands adjacent lakes; assesses the differences between wetlands adjacent lakes and freestanding wetlands in terms of ecological differences, differences in wildlife functions, differences in water quality functions, and social and economic differences; provides an overview of applicable sections of the proposed MN DNR shoreland rules; and makes recommendations for best regulating wetlands adjacent lakes as part of the shoreland ordinance and future citizen participation, based on all of the aspects previously discussed.

2.0 Background Information on Wetlands Adjacent Lakes in Maplewood

In order to better understand the nature and regulatory context of wetlands adjacent lakes in Maplewood, it is important to review the definition, types, location, and current regulation of these wetlands.

2.1 Wetlands – Types and Definitions

Wetlands are important ecosystems. They are characterized by specific hydrology, soil conditions, and vegetation. Wetlands have water tables at or near the surface, often resulting in standing water or waterlogged conditions for most of the growing season; hydric soils that are saturated in the upper parts for at least parts of the year, resulting in anaerobic conditions; and hydrophytic vegetation that is adapted to the typical wetland hydrology and soils (DeBarry, 2004; MN BWSR, n.d.b). Wetlands have been officially defined under the Clean Water Act, as listed in the U.S. Environmental Protection Agency (U.S. EPA) regulations:

> The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.
> (40 C.F.R. § 230.3(t))

The city of Maplewood defines wetlands as follows:

> Wetlands means those areas of the city inundated or saturated by groundwater or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas as defined. Where a person has removed or mostly changed the vegetation, one shall determine a wetland by the presence or evidence of hydric or organic soil and other documentation of the previous existence of wetland vegetation such as aerial photographs. This definition does not include lakes or stormwater ponds as herein defined.
> (City of Maplewood, 2009, pp. 5-6)

Due to location-dependent differences in climate, hydrology, soil conditions, vegetation, topography, land use, and similar factors, many different types of wetlands exist (U.S. EPA, 2010). Wetlands can be found both along the seacoast and inland. Coastal wetlands are typically tidal marshes, while inland wetlands include non-tidal marshes, wet meadows, prairie potholes, playa lakes, forested and shrub swamps, and bogs (U.S. EPA, 2010).

Wetland types that are commonly found in Minnesota include bogs or peatlands, shallow and deep marshes, prairie potholes, shrub and wooded swamps, seasonal basins or flats, and wet meadows (MN DNR, n.d.c). Although all of these exhibit the hydric soils, high water table, and hydrophytic vegetation characteristic for wetlands, they differ in the vegetation and wildlife species present, water levels, soil conditions, and location. Deep marshes typically have standing water year round, while shallow marshes, swamps, and bogs, are waterlogged for most of the growing season and seasonally flooded basins are completely dry for several months out of the year. Most of these wetlands have type-specific vegetation: Wooded swamps are predominated by hardwoods and conifers, shrub swamps by shrubs and small tress, marshes by grasses and herbaceous plants, and shallow open waters by aquatic plants. Some of the wetlands can found in shallow depressions or on flat terrains, others fill in lake basins, and again others border lakes or streams. The MN DNR categorizes these wetlands as eight, distinct types based on their hydrology, soil conditions, and vegetation (see Table 1).

Table 1: Technical Definitions of Minnesota Wetland Types

Type	Soil	Hydrology	Vegetation	Common Sites	NWI Symbols
Type 1: Seasonally Flooded Basin or Flat	Usually well-drained during much of the growing season.	Covered with water or waterlogged during variable seasonal periods.	Varies greatly according to season and duration of flooding from bottomland hardwoods to herbaceous plants.	Upland depressions, bottomland hardwoods (floodplain forests).	PEMA, PFOA, PUS
Type 2: Wet Meadow	Saturated or nearly saturated during most of the growing season.	Usually without standing water during most of the growing season but water logged within at least a few inches of the surface.	Grasses, sedges, rushes, various broad-leaved plants.	May fill shallow basins, sloughs, or farmland sags; may bolder shallow marshes on the landward site and include low prairies, sedge meadows, and calcareous fens.	PEMB

Type 3: Shallow Marsh	Usually waterlogged early during the growing season.	Often covered with 6 inches or more of water.	Grasses; bulrush; spikerush; and various other marsh plants, such as cattail, arrowhead, pickerelweed, and smartweed.	May nearly fill shallow lake basins or sloughs; may border deep marshes on landward side, commonly as seep areas near irrigated lands.	PEMC and F, PSSH, PUBA and C
Type 4: Deep Marsh	Inundated.	Usually covered with 6 inches to 3 feet or more of water during growing season.	Cattail, reed, bulrush, spikerush, and wild rice; open areas may have pondweed, naiad, waterweed, duckweed, waterlily, and spatterdock.	May completely fill shallow lake basins; potholes, limestone sinks, and sloughs; may border open water in such depressions.	L2ABF, L2EMF and G, L2US, PABF and G, PEMG and H, PUBB and F
Type 5: Shallow Open Water	Inundated.	Usually covered with less than 10-foot deep water; includes shallow ponds and reservoirs.	Fringe of emergent vegetation similar to open areas of "Deep March".	Shallow lake basins and may border large open water basins.	L1; L2ABG and H; L2EMA, B, and H; L2RS; L2UB; PABH; PUBG and H.
Type 6: Shrub Swamp	Usually waterlogged during growing season.	Often covered with as much as 6 inches of water; water table is at or near the surface.	Includes alder, willow, buttonbrush, dogwood, and swamp privet.	Along sluggish streams, drainage depressions, and occasionally on flood plains.	PSSA, C, F, and G; PSS1, 5, and 6B
Type 7: Wooded Swamp	Waterlogged within a few inches of the surface during the growing season.	Often covered with as much as 1 foot of water; water table is at or near the surface.	Hardwood and coniferous swamps with tamarack, northern white cedar, black spruce, balsam fir, balsam poplar, red maple, and black ash; deciduous sites frequently support beds of duckweed and smartweed.	Mostly in shallow ancient lake basins, old riverine oxbows, flat terrains, and along sluggish streams.	PFO1, 5, and 6B; PFOC and F
Type 8: Bog	Usually waterlogged.	Water table at or near the surface.	Woody, herbaceous, or both supporting a spongy covering of mosses; typical plants are heath shrubs, sphagnum mosses, sedges, leatherleaf, Labrador tea, cranberry, and cottongrass; may include stunted black spruce and tamarack.	Mostly on shallow glacial lake basins and depressions, flat terrains, and along sluggish streams.	PFO2, 4, and 7B; PSS2, 3, 4, and 7B

Adapted from "Technical definition of wetland types in Minnesota" by Minnesota Department of Natural Resources [MN DNR], n.d., http://www.dnr.state.mn.us/wetlands/types_technical.html.

Wetlands adjacent lakes are wetlands that are directly connected to lakes or part of the lakes' edges. They are also commonly known as "fringe wetlands." Wetland types commonly found adjacent lakes in Minnesota include shallow and deep marshes, as well as shallow open water. Maplewood defines wetlands adjacent lakes as "those areas of land or vegetation that have

been classified as wetlands by an applicable Watershed District in accordance with the Minnesota Routine Assessment Method (MnRAM) system but which are attached to or part of the edge of a lake as defined herein" (City of Maplewood MN, 2009b, p. 6).

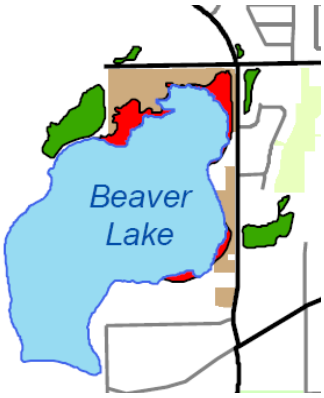
2.2 Wetlands Adjacent Lakes in Maplewood

Five of the lakes in Maplewood have adjacent wetlands: Beaver Lake, Kohlman Lake, Lake Oehrline, Spoon Lake, and Wakefield Lake. The figures below show the location of the wetlands in relation to each lake in accordance with the city's Wetland Map, and the type of each wetland in accordance with the National Wetlands Inventory (NWI).

Beaver Lake

The city classified the wetlands adjacent Beaver Lake as Manage A wetlands (shown in red in Figure 1a). According to NWI, the lake is considered permanently flooded shallow water (L1UBH), while the adjacent wetlands are semi-permanently flooded shallow marshes (PEMF) (see Figure 1b) (U.S. FWS, n.d.). Some residential properties are located along these wetland and the remaining areas are open space and county park areas (City of Maplewood MN, 2010).

Figure 1: Beaver Lake



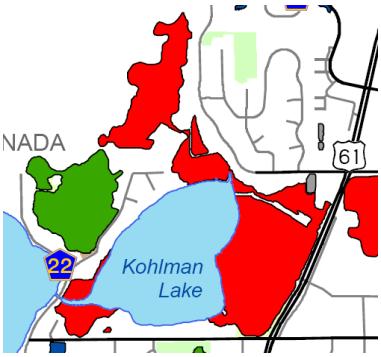
1a) Wetland map of Beaver Lake. Excerpt from "Wetland Map" by City of Maplewood MN, December 2009.

1b) Aerial Photographs of Beaver Lake. Taken from the USA National Wetlands Inventory using Arcgis Mapping, http://explorer.arcgis.com/.

Kohlman Lake

The wetlands adjacent Kohlman Lake are classified as Manage A wetlands by the city (shown in red in Figure 2a). According to the NWI, the lake is considered permanently flooded shallow open water (L1UBH), and the adjacent wetlands immediately surrounding it are seasonally flooded shallow marshes (PEMC) (see Figure 2b). These wetlands, in turn, are connected to partly drained/ditched, seasonally flooded forested swamps (PFO1Cd) further outward (see Figure 2b) (U.S. FWS, n.d). The wetlands are located in open space (City of Maplewood MN, 2010).

Figure 2: Kohlman Lake



2a) Wetland map of Kohlman Lake. Excerpt from "Wetland Map" by City of Maplewood MN, December 2009.

2b) Aerial photographs of Kohlman Lake. Taken from the USA National Wetlands Inventory using Arcgis Mapping, http://explorer.arcgis.com/.

Lake Oehrline

Maplewood classifies Lake Oehrline as Manage B wetland (shown in green in Figure 3a). In accordance with the NWI, the lake is considered permanently flooded shallow open water (PUBH) (see Figure 3b) (U.S. FWS, n.d.). The shoreland around the lake is fully developed with residential properties (City of Maplewood MN, 2010).

Figure 3: Lake Oehrline

3a) Wetland map of Lake Oehrline. Excerpt from "Wetland Map" by City of Maplewood MN, December 2009.

3b) Aerial photographs of Lake Oehrline. Taken from the USA National Wetlands Inventory using Arcgis Mapping, http://explorer.arcgis.com/.

Spoon Lake

The city classifies the wetland adjacent Spoon Lake as Manage B wetland. According to the NWI, the lake is considered an intermittent exposed shallow open water, while the adjacent wetlands are seasonally flooded shallow marshes (PEMC) and, further outward, saturated meadows (PEMB) and seasonally flooded shrub swamps (PSS1C) (see Figure 4b) (U.S. FWS, n.d.). These wetlands are located in open space (City of Maplewood MN, 2010).

Figure 4: Spoon Lake

4a) Wetland map of Spoon Lake. Excerpt from "Wetland Map" by City of Maplewood MN, December 2009.

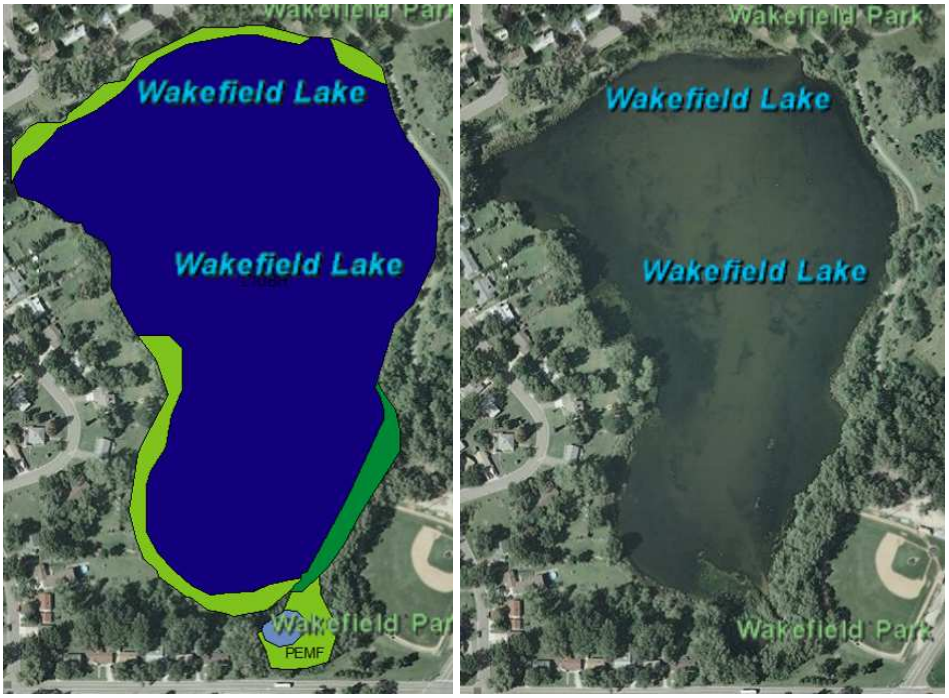
4b) Aerial photographs of Spoon Lake. Taken from the USA National Wetlands Inventory using Arcgis Mapping, http://explorer.arcgis.com/.

Wakefield Lake

The wetlands adjacent Wakefield Lake are classified as Manage B wetlands by the city (shown in green in Figure 5a). The lake is considered permanently flooded shallow open water (L1UBH), and the wetlands adjacent the lake are semi-permanently flooded shallow marshes (PEMF) (see Figure 5b) (U.S. FWS, n.d.). Residential properties are located along the wetlands in the southwest of the lake, while city park lands border the remaining wetland areas (City of Maplewood MN, 2010).

Figure 5: Wakefield Lake

5a) Wetland Map of Wakefield Lake. Excerpt from "Wetland Map" by City of Maplewood MN, December 2009.



5b) Aerial photographs of Wakefield Lake. Taken from the USA National Wetlands Inventory using Arcgis Mapping, http://explorer.arcgis.com/.

2.3 Importance of Wetlands

"Wetlands are some of the most biologically productive natural ecosystems in the world, comparable to tropical rain forests and coral reefs in their productivity and the diversity of species they support" (U.S. EPA, 2001, p. 2). The chemical, biological, and physical processes and traits of a wetland are known as wetland functions. Some of the distinctive functions of

wetlands and their buffers are: wildlife habitat and food web support; nutrient transformation, biological and mechanical filters preventing pollutants from entering lakes, rivers, and groundwater; groundwater recharge and discharge; surface water retention or detention; and flood control (MN DNR, n.d.a). Distinct from these inherent naturally occurring functions are human uses of and interactions with wetlands, which affect the wetland's ecology, wildlife function, water quality, and social and economical functions. Society also puts value on wetlands, including the commercial value of fish and wildlife due to fishing and hunting, recreational opportunities, supply of drinking water, filtration system for water quality, and flood and erosion control (MN DNR, n.d.a).

The most common method for assessing individual wetland functions/values is to visit the wetland and to assess possible functions on a function-by-function basis based upon observed characteristics of the wetland and surrounding lands and waters. A variety of rapid, formal wetland assessment methods have been developed by scientists to help evaluate the functions and values of particular wetlands, such as MnRAM (Kusler, n.d.).

2.4 Current Regulation of Wetlands Adjacent Lakes in Maplewood

On December 14, 2009, the city of Maplewood updated its wetlands ordinance (Ordinance NO. 895), which adopts the wetland classification map based on a study conducted using MnRAM and approved by all watershed districts, including the Ramsey-Washington Metro Watershed District (RWMWD) in which all wetlands adjacent lakes in Maplewood are located (City of Maplewood MN, 2009b; MN BWSR, n.d.a). The wetland ordinance is shown in Appendix 1. Regulation of wetlands adjacent to lakes will follow this new ordinance until December 31, 2012, or until the city adopts a new shoreland ordinance regulating these wetlands,

whichever occurs first (City of Maplewood MN, 2009b). If the shoreland ordinance is not updated by the end of 2012 and the sunset provisions are not extended, wetlands adjacent lakes will be regulated again under the same provisions as the freestanding wetlands.

The purpose of Maplewood's wetland ordinance is to (City of Maplewood MN, 2009b):

- Protect wetlands and streams from degradation, pollution, and the accelerations of aging by regulating land use around wetlands and streams (Section 1, Subsection d).
- "Educate the public (including appraisers, owners, potential buyers, and developers) about the importance of wetlands and streams and the functions of buffers" (Section 1, Subsection g).
- "Encourage property owners who live adjacent to and/or near wetlands and streams to be responsible stewards by managing and enhancing quality of buffers" (Section 1, Subsection g).

There are four classes of wetlands based on their quality and condition. Standard buffer zones are assigned to each class, with different buffer zones for wetlands adjacent to lakes. Buffer zones for these wetlands are smaller due to the fact that lakes perform different functions and are used for different recreational purposes than freestanding wetlands. Wetlands classes and buffer widths based on MnRAM as outlined in the wetland ordinance are:

> *Wetland classes* are defined as follows:
>
> > *Manage A*- based on the "Preserve" wetlands classification as define in MnRAM. These wetlands are exceptional and the highest-functioning wetlands.
> >
> > *Manage B*- based on the "Manage 1" wetland classification as defined in MnRAM. These wetlands are high-quality wetlands.
> >
> > *Manage C*- based on the "Manage 2" wetland classification as defined by MnRAM. These wetlands provide moderate quality.
> >
> > *Stormwater Pond*- These are ponds created for stormwater treatment. A stormwater pond shall not include wetlands created to mitigate the loss of other wetlands.
>
> (City of Maplewood, 2009b, Section 2)

Wetland Classification	Minimum Buffer Width	Minimum Buffer Widths for Wetlands Adjacent Lakes	Structure Setback from Edge of Buffer
Manage A	100’	75’	0’
Manage B	75’	50’	0’
Manage C	50’	50’	0’
Stormwater Pond	10’	N/A	10’

(City of Maplewood, 2009b, Section 4, Subsection a and Subsection d)

The following sections briefly outline other parts of the wetland ordinance, including development and construction activities; activities in wetlands, streams, and buffers; best management practices; and variances.

Development and Construction Activities

A wetland buffer management worksheet must be submitted to the City Council for certain activities within a wetland buffer. According to the wetland ordinance, the following activities are not allowed in wetlands, streams, or buffer, unless an exemption applies:

1. Alterations, including the filling of wetlands.
2. The construction of structures.
3. Projects which convert native or naturalized areas to lawn area.
4. The construction of stormwater drainage facilities, sedimentation ponds, infiltration basins, and rain gardens within a buffer.
5. The discharging of stormwater to a wetland must comply with the city’s stormwater management ordinance (Section 44-1245, or subsequent stormwater ordinances).

(City of Maplewood 2009b, Section 5, Subsection a).

The following activities are exempt:

1. Walking, passive recreation, fishing or other similar low-impact activities.
2. The maintenance of pre-existing, nonconforming lawn area.
3. The removal of trees or vegetation that is dead, dying, diseased, *noxious*, or hazardous in a manner that does not cause the compacting or disturbing of soil through vehicle or equipment use.
4. The removal of *noxious* weeds by non-chemical methods, or by means of chemical treatment in accordance with application methods that prevent the introduction of toxic chemicals into wetlands and streams.

5. The removal of non-native shrubs, such as buckthorn, if:
    a) there is little chance of erosion; and
    b) site is flat or generally has slopes less than 6 percent grade; and
    c) cut and treat method of removal is used on shrubs more than one-half (½) inches in diameter (not pulling).
6. *Selective* management of vegetation as follows:
    a) Selective pruning of trees or shrubs in order to enhance their health.
    b) Selective removal of tree saplings (less than 2 inches in diameter) in order to enhance wildlife value of the buffer.
    c) Selective removal of non-native trees.
    d) Selective removal of non-native weeds.
    e) Selective seeding or planting of vegetation that is native to Minnesota.
7. Installation of temporary fencing without footings.
8. Projects within the buffer that are the subject of a wetland buffer management worksheet approved by the administrator.
9. Public or semi-public streets and utilities. The city council may waive the requirements of this ordinance for the construction or maintenance of public or semipublic streets and utilities through buffers where it determines that there is a greater public need for the project than to meet the requirement of this ordinance. In waiving these requirements the city council shall apply the following standards:
    a) The city may only allow the construction of public or semipublic utilities and streets through buffers where there is no other practical alternative.
    b) Before the city council acts on the waiver the planning commission and the environmental and natural resources commission shall make a recommendation to the city council. The planning commission shall hold a public hearing for the waiver. The city shall notify the property owners within five hundred (500) feet of the property for which the waiver is being requested at least ten (10) days before the hearing.
    c) Utility or street corridors shall not be allowed when endangered or threatened species are found in the buffer.
    d) Utility or street corridors, including any allowed maintenance roads, shall be as far from the wetland as possible.
    e) Utility or street corridor construction and maintenance shall protect the wetland and buffer and avoid large trees as much as possible.
    f) The city shall not allow the use of pesticides or other hazardous or toxic substances in buffers or wetlands; however, in some situations the use of herbicides may be used if prior approval is obtained from the administrator.
    g) The owner or contractor shall replant utility or street corridors with appropriate native vegetation, except trees, at preconstruction densities or greater after construction ends. Trees shall be replaced as required by city ordinance.
    h) Any additional corridor access for maintenance shall be provided as much as possible at specific points rather than to the road which is parallel to the wetland edge. If parallel roads are necessary they shall be no greater than fifteen (15) feet wide.

i) The city council, upon recommendation of the administrator, may require additional mitigation actions as a condition of granting the waiver.

10. Public or semipublic trails. The city may waive the requirements of this ordinance for the construction or maintenance of public or semipublic trails through buffers, and boardwalks in wetlands, where it determines that there is a greater public need for the project than to meet the requirement of this ordinance. In waiving these requirements the city shall apply the following standards:
    a) Trails shall not be allowed when endangered or threatened species are found to be present in the buffer.
    b) Buffers shall be expanded, equal to the width of the trail corridor.
    c) The owner or contractor shall replant all disturbed areas next to the trail in a timeframe approved by the city.
    d) All necessary erosion control measures must be in place before constructing a trail. The erosion control measures must also be maintained and inspected by the city to ensure that the wetland or stream is not compromised by trail construction activities.
    e) The trail must be designed and constructed with sustainable design methods.
    f) Boardwalks are allowed within the buffer and shall be a maximum of six (6) feet in width for semipublic use and twelve (12) feet in width for public use.
    g) The administrator may require additional mitigation actions as specified in Section 5.d. (Mitigation).

(City of Maplewood MN, 2009b, Section 5, Subsections a and b)

Special construction practices are required for construction near wetlands. All special construction practices shall be approved by the administrator before issuance of a grading or building permit. These practices can include grading, sequencing, vehicle tracking platforms, additional silt fences, additional sediment control, wetland buffer sign standards, erosion control installation, erosion control breaches, erosion control removal, and platting (City of Maplewood MN, 2009b, Section 5, Subsection c). Mitigation may also be needed when a wetland or buffer has been altered, a mitigation plan will be submitted to the administrator for approval.

Activities in Wetlands

A wetland buffer management worksheet must be submitted to the City Council for certain activities within a wetland buffer. The same activities that are restricted for construction

and development projects apply here as well. In addition to the exemptions applying to construction and development projects, the following activities are permitted:

> *1-8 are the same as for construction and development.*
> 9. For properties that are zoned single or double-dwelling residential or are used as a single or double-dwelling residential use:
> a) The use, maintenance, and alteration of existing nonconforming lawn area for the purpose of outdoor enjoyment which may include gardening, nonpermanent structures (including such things as storage sheds under 120 square feet in area, swing sets and volleyball nets), impervious patios, or fire pits.
> b) Work within a wetland, stream, or buffer which was approved by the Minnesota Department of Natural Resources water permitting process and access to those areas by a trail which is limited to the width of the permit.
> (City of Maplewood MN, 2009b, Section 6, Subsection c).

Best Management Practices

When a property owner or contractor alters or will alter a wetland, stream, or buffer the city promotes, or in some instances requires them, to use best management practices, such as restoring buffers with native planting, managing weeds in buffer, reducing stormwater runoff and/or improve the quality of stormwater runoff entering a wetland or stream (City of Maplewood MN, 2009b, Section 7). These practices are used to minimize negative effects on stormwater runoff and loss of wildlife habitat.

Variances

Variances must be recommended by the Environmental and Natural Resources Commission to the Planning Commission, which will then take it to the City Council. The Planning Commission will then hold a public hearing, of which nearby property owners within five hundred feet will be notified at least ten days in advance. Mitigation procedures may be required of the applicant for any wetland, stream, or buffer alteration impact for the variance to

be approved (City of Maplewood MN, 2009b, Section 8). Variance approval goes along with the following findings:

a) Strict enforcement would cause undue hardship because of circumstances unique to the property under consideration. The term "undue hardship" as used in granting a variance means the owner of the property in question cannot put it to a reasonable use if used under conditions allowed by the official controls; the plight of the landowner is due to circumstances unique to his property, not created by the landowner; and the variance, if granted, will not alter the essential character of the locality. Economic considerations alone are not an undue hardship if reasonable use for the property exists under the terms of this ordinance.
b) The variance would be in keeping with the spirit and intent of this ordinance.

(City of Maplewood MN, 2009b, Section 8, Subsection a.4).

3.0 Citizen Input

A questionnaire has been designed for Maplewood residents of properties with wetlands adjacent lakes (see Appendix 2). On March 3, 2011, a total of 40 questionnaires were sent out to the affected properties on Beaver Lake (11 questionnaires), Wakefield Lake (4 questionnaires), and Lake Oehrline (25 questionnaires) (see Appendix 3). Two properties at Beaver Lake are vacant, so that the questionnaire could not be forwarded. By the end of March, a total of 17 responses have been received, 7 from Beaver Lake, 8 from Lake Oehrline, and 2 from Wakefield Lake (see Appendix 4). Additionally, input was received from a resident at Wakefield Lake (personal communication, March 1, 2011).

Due to the limited number of responses received, a statistical analysis of the responses is not feasible. However, some conclusions can be drawn:

1. Setbacks of non-water access oriented structures on these properties differ widely, as does the proximity of lawn areas to the shoreline. This is likely due to the fact that these properties have been developed at different times and thus subject to different setback and buffer standards.

2. Some residents are in formal or informal groups involved in wetland, shoreland and lake protection, as well as wildlife preservation. An association of residents/property owners has been formed at Lake Oehrline for the purpose of controlling excess submerged vegetation, such as algae and weeds. Additionally, the resident at Wakefield Lake stated that a neighborhood group had been formed that was actively involved when the city last updated its wetland ordinance.
3. Residents use their shoreland properties for a variety of recreational purposes, including watercraft access, recreation and picnic areas, campfires, and landscaping, as well as fishing from the shore, wildlife enjoyment, and enjoyment of the scenery. On publicly owned shoreland properties, walkers, runners, and bikers enjoy paths close to the water and anglers enjoy shore fishing or fishing from the dock. No respondent indicated that the lakes are used for swimming. One respondent from Wakefield Lake states water pollution due to stormwater drainage into the lake as reason why swimming is not possible.
4. Many properties with wetlands adjacent lakes have large lawn areas. In some cases, the lawn area extends very close to the actual shoreline. Responses also indicated that some natural vegetation is often maintained. Shoreline alterations often involve the addition of docks and related access paths, as well as removal of non-native species, such as buckthorn. Fencing is sometimes used for wildlife control.
5. The limited responses indicate a tendency of residents to oppose new developments and to favor landowner/resident workshops for shoreland and wetland management and regulation of the wetlands adjacent lakes as part of the shoreland ordinance. Opinions are split regarding more stringent buffer requirements and allocating of city funds for

wetland preservation. Additionally, the responses indicate that residents overall rate land and wetland preservation, wildlife protection, and water quality protection as priorities, recreational uses as slight priorities, and new land developments as no priorities. It is interesting to note that water quality protection is rated as a priority by almost all respondents, while only about half favor more stringent buffer requirements, even though buffer requirements directly affect water quality. Overall, these preferences and tendencies must be viewed carefully, as they are only based on few responses and thus not representative of all affected residents.

6. Some residents are concerned about large populations of deer, duck, and geese, indicating that these move very freely on shoreland properties and close to residential structures.
7. Some residents have water quality concerns. Both Beaver Lake and Lake Oehrline have weed problems. Residents indicate contradictions between activity restrictions on private shoreland properties to reduce water pollution and storm sewers/ storm drains that empty directly into the lakes. Many respondents severely criticize direct releases of stormwater from storm sewers/drains into the lakes. One respondent also speaks of a contradiction between private property use restrictions and uses of publicly owned lakeshore properties. Pollution from recreational activities, such as fishing, has also been indicated by a respondent. A respondent at Lake Oehrline indicates that water quality improvements have been witnessed after the installation of rain gardens and swales.
8. Residents indicate that a balance must be achieved between preservation and recreation. The Wakefield Lake resident said the same. Regulating new developments seems

reasonable to many, but some residents question the effectiveness of activity restrictions on already developed properties. Most of the property owners along the lakes and subsequently along the wetlands purchased their property to take part in recreational activities in the lake and to have lake access through the wetlands. Residents argue that property owners should be able to use their properties as intended – as residences and for recreational purposes.

9. Financial aspects need to be considered. One resident would appreciate financial incentives for maintaining buffers, for example, in the form of tax benefits. Another resident indicates that requirements for mitigation and restoration practices would be difficult for many property owners to fulfill unless financial and technical assistance were provided.
10. The received responses and personal conversation with the Wakefield Lake resident indicate that more information and education is needed for residents of shoreland properties in general and properties with wetlands adjacent lakes in particular. Affected residents need to be better informed what wetlands adjacent lakes exactly are and how they “look”. As the Wakefield Lake resident pointed out, wetlands adjacent lakes often simply look like part of the lake. This information is necessary to show residents why wetlands adjacent lakes need to be considered separately from the lakes. Additionally, residents need to be better informed about what the thoughts are behind the planned regulation of wetlands adjacent lakes under the shoreland ordinance instead of the wetland ordinance, and how this would affect the residents of properties with these wetlands. Moreover, residents must be better informed about the importance of buffers and restrictions of certain activities in the buffer zone. Most of the respondents were in

favor of best management practice workshops for shoreland property owners. Specifically, it is important to emphasize the enormous benefits these "backyard" activities can have, even in comparison to problems caused by large-scale practices, such as the direct release of stormwater into lakes. Residents view stormwater releases as direct contradiction to what is expected from them. Thus, the city should also inform residents about what the city does to control stormwater pollution and minimize the problems resulting from stormwater releases.

4.0 Assessment of Differences between Wetlands Adjacent Lakes and Freestanding Wetlands

Differences between wetlands adjacent lakes and freestanding wetlands generally result from what wetlands adjacent lakes do for lakes and the wildlife of the lake and shoreland, how wetlands adjacent lakes have adapted to being connected to lakes, and how wetlands adjacent lakes are used a result of their proximity to the lakes. The following assesses differences in ecology, wildlife, water quality, and social and economic value and use.

4.1 Ecological Differences

Freestanding wetlands are not usually connected to other wetlands or other water bodies by surface water, but may become hydrologically linked to other wetlands if during extremely wet seasons surface water overflows from one depressional wetland to another (Tiner, 2003). Freestanding wetlands collect freshwater from precipitation, ground-water discharge, stream flow, and overland flow, so the rate in which these wetlands store water depends upon season fluctuations (U.S. GS, 1997). Most of these depressional wetlands dry out annually, which

excludes organisms that require permanent water, like fishes and many amphibians, and favors species adapted to fluctuating water levels. These fluctuations cause variations in community structure, as populations are replaced by species better adapted to abiotic conditions occurring at the time (Liebowitz, 2003).

From an ecological standpoint, freestanding wetlands are among the country's most significant biological resources (Comer et al., 2005). In some areas, isolation has led to the evolution of endemic species vital for the conservation of biodiversity (Comer et al, 2005). Much of the importance attributed to smaller, isolated wetlands is related to biodiversity. These wetlands often have high species richness due to moisture gradients caused by gentle slopes and seasonally varying moisture conditions (Liebowitz, 2003).

In other cases, their isolation and sheer numbers in a given locality have made these wetlands crucial habitats for amphibian breeding and survival or for waterfowl and waterbird breeding (Comer et al., 2005). Plants and animals of freestanding wetlands have become very well adjusted to the seasonal ebbs and flows of the water received in these wetlands and have evolved to survive the different nutrient loads and water levels, which establishes a very balanced ecology for the freestanding wetlands.

Being freestanding is also an important factor in evolutionary biology, population genetics, source/sink dynamics, and metapopulation dynamics (Edwards & Sharitz, 2000; Levins, 1970). Isolation may contribute to wetland function by supporting metapopulations. Levins (1970) introduced the term "metapopulation" to refer to a population of populations. "Metapopulation dynamics consist of local extinctions of individual populations within distinct habitat patches, due to environmental or demographic stochasticity, and recolonization of this habitat from neighboring patches through dispersal" (Levin, 1970). Ecological isolation may be

an important influence in determining certain community characteristics of freestanding wetlands, such as in reducing competition and supporting metapopulations (Leibowitz, 2003). The freestanding wetlands of Minnesota show these metapopulation dynamics, which make them different from the wetlands adjacent lakes.

There are biotic connections that can occur between freestanding wetlands and other aquatic and terrestrial ecosystems. For example, many animals, including amphibians require both aquatic and terrestrial habitat at different life history stages (Gibbons, 2003). Freestanding wetlands and their functions related to other wetlands seem to suggest: many of the biological features of freestanding wetlands may result not from isolation per se, but from environmental conditions that can also occur in non-isolated wetlands (Liebowitz, 2003).

Unlike freestanding wetlands, wetlands adjacent lakes have a diverse species population because their environment is not drastically changing. Because of the diverse and balanced species populations, they are healthier as they are more resistant to disease and other changes in the environment and shoreland areas provide a unique ecological zone that is required for certain plant and animal species (MN DNR, 2011), which freestanding wetlands do not have.

4.2 Differences in Wildlife Functions

According to the U.S. EPA, wetlands are favored by so many species because “they attract wildlife for a number of reasons: 1) their vegetative cover provides shelter from predators; 2) they provide ideal nesting conditions for many waterfowl; 3) they provide migratory birds with a safe stop over location to rest during long migrations; 4) they provide essential spawning and nursery habitat for commercially important fish and shellfish; and 5) many have an extensive, complex food chain that supports numerous species, including man” (2011, p. 53).

Wetlands provide vital habitat for a wide variety of species, which include waterfowl, birds, mammals, reptiles, amphibians, fish, and insects. Up to 45% of these wetland species are endangered (U.S. EPA, 2011).

"A diverse assemblage of flora and fauna have adapted to, and are thus dependent on, the historic abundance and seasonality of wetlands for their life history needs" (NRCS, 2006a, p.3). Both freestanding wetlands and wetlands adjacent lakes support a huge population of waterfowl, songbirds, shorebirds, wading birds, reptiles, amphibians, and many invertebrate species. Wetland complexes containing a variety of wetland types, which include freestanding and wetlands adjacent lakes, are needed to meet the various habitat requirements of these species (NRCS, 2006a).

Even though freestanding wetlands are freestanding, they can be connected to each other and to other aquatic systems by way of animals and plants. Animals, such as birds, rely on a number of different wetlands types for food, shelter and protection, breeding, and other needs (Yerkes, 2000) and different fauna can grow in different wetland types because of seed dispersal by wind. For example, even though prairie potholes of Minnesota are freestanding, they are not isolated habitats. They support "more than 200 species of migratory birds and produces more than 50 percent of the ducks in North America, even though it accounts for only 10 percent of the entire North American duck breeding area" (NRCS, 2006b, p.1). Most wetland plants and animals found in the region, with the exception of species such as fish, have the mobility or dispersability needed to spread rapidly from pothole to pothole (van der Valk & Pederson, 2003).

Geographically speaking, freestanding wetlands regularly include a wide range of hydrologic conditions, such as shallow temporary ponds to deeper permanent waters, which leads to a diversity of habitat types and quality, both within and among wetlands (Tiner, 2003).

According to the National Resource Conservation Service (NRCS, 2006a):

> Even seasonal and temporary wetlands provide critical habitat for wildlife adapted to breeding exclusively in these areas. (…) Seasonal and temporary wetlands are ideal nursing areas for developing amphibians because of the relatively warm water temperatures, abundant microorganisms for food, and lack of predators. Temporary wetlands provide ideal courtship and egg-laying location for amphibians because they tend to dry out in the summer, making them unable to support fish, which are effective predators of amphibian eggs, larvae, and adults. Like amphibians, many invertebrates require the fish-free aquatic environments of wetland in which to lay eggs and/or go through larval stages. Invertebrates also take advantage of the seasonality of wetlands as their egg and larval stages often correspond to wet times of the year. Invertebrates are vital to the survival of wetland ecosystems, as they form the base of the food chain. (p.3)

Since wetlands water chemistry is a result of the geologic setting, water balance, quality of entering water, type of soils and fauna, and human activity within or near the wetland and all of these aspects play an important factor in the wildlife found in wetlands adjacent lakes. Whether the wetlands are freestanding or adjacent lakes, the habitat the wetlands provide is unquestionably necessary because some species spend their entire lives in wetlands, while other species use them intermittently for feeding or rearing their offspring. The main difference is that wetlands adjacent lakes support a population of fish that freestanding wetlands do not. The majority of fresh water fish are considered dependent upon wetlands adjacent lakes. They provide unique fringe habitat due to lower water depths, frequently warmer water temperatures, and more dense vegetative cover. Fish depend on the wetlands for their food source and for protection (MN DNR, n.d.a). Wetlands adjacent lakes provide protection for young fish and are important for a spawning area for fish (MN DNR, n.d.a). They also provide habitat for mammals, such as minks, raccoons, beavers, muskrats, and otters, offering food and thermal cover during severe Minnesota winters (The Mitt Watershed Council, n.d.). For wildlife populations to be healthy, they must be able to access their required habitats and if wildlife is limited in their ability to access their required habitats, the health of these populations can decline (NCRS,

2006). According to the community input the wetlands adjacent lakes are habitat for deer, geese, and ducks and these animals are encroaching on the residential areas instead of maintaining and acceptable distance within the buffers.

According to the U.S. EPA, “wetlands adjacent lakes can be thought of as ‘biological supermarkets’" (2008, Section 2). Wetlands adjacent lakes produce vast quantities of food that attract many different species. These complex feeding relationships among the organisms that inhabit wetlands are called food webs. “The combination of shallow water, high levels of inorganic nutrients, and high rates of primary productivity (the synthesis of new plant biomass through photosynthesis) in many wetlands is ideal for the development of organisms that form the base of the food web” (U.S. EPA, 2008, Section 2).

4.3 Differences in Water Quality Functions

According to the Clean Water Act, 40 CFR, MN Rule Chapter 7050, “water quality standard defines the water quality goals of a water body, or thereof, by designating the use or uses to be made of the water, by setting water quality criteria necessary to protect the uses, and by preventing degradation of water quality through anti-degradation provisions. States adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act” (Minnesota Sea Grant, 2005). Like freestanding wetlands, wetlands adjacent lakes are capable of removing pollutants, excess nutrients, and sediments from the water that passes through them, but wetlands adjacent lakes also reduce environmental problems, such as algal blooms, dead zones, and fish kills, which are linked to excess nutrient loadings. However, the capacity of wetlands to function this way is not unlimited,

and too much surface runoff carrying sediments, nutrients, and other pollutants can degrade wetlands and thus the societal services they provide (U.S. EPA, 2008).

In terms of water quality, it is important to distinguish between the water quality of the wetland buffer and of the wetland itself. Water quality benefits of the buffer depend on the flow pattern, vegetation type, percent of slope, soils type, surrounding land, pollutant types and concentrations, and precipitation patterns. The type and intensity of the land use within the buffer zone will have an effect on determining the water quality. If the land use in this buffer zone is used for urbanization or agriculture then the amount of sediments and contaminants can change the hydrology of the wetland (Environmental Law Institute, 2008). Wetland buffers of 50 ft to 100 ft are reasonable, and will remove more pollutants, protect from erosion, and be less likely to be degraded due to human activities. A 50 ft buffer is considered to be absolute minimum necessary for water quality control (Wenger, 1999; Emmons and Olivier Resources, Inc. 2001; cited in Radomski, 2009). The MN Agriculture Feedback Summary states that a 50 ft buffer will benefit water quality and water resources, and the water quality is dependent on this buffer (Otterson, 2009). However, there are numerous studies showing that 75 ft to 100 ft would be better.

Table 2 shows two studies that were published regarding buffer effectiveness in the "Planner's Guide to Wetland Buffers for Local Government" and "Benefits of Wetland: A Study of Functions, Values and Size". According to the two studies:

- Removal of sediments or total suspended solids requires a minimum buffer of 50 ft to be effective. For finer sediments, a minimum buffer of about 70 ft is required. Wider buffers are required for more consistent sediment and solid removal. Removal efficiencies of 80% and more require buffers of at least 100 ft.

- Removal of total phosphorus also requires a minimum buffer of 50 ft. However, larger buffers are recommended for higher removal efficiencies.
- Removal of total nitrogen can be achieved in buffers below 50 ft, but a minimum of 50 ft is recommended for effective removal and increases to up to 100 ft are recommended for removal efficiencies of 90% and more.
- Over longer periods of time, shorter buffers can become saturated with sediments and this will reduce the effectiveness of the buffer.

Table 2: Comparison of Two Studies Assessing Buffer Effectiveness.

	From: Benefits of Wetland Buffers: A Study of Functions, Values and Size	**From: Planner's Guide to Wetland Buffers for Local Governments**
Removal of Sediments or Total Suspended Solids (TTS)	The reports…seem to reach a consensus that "good" solids reduction begins with a buffer width of about 50'. …the graphic indicates that TSS reductions of 70% and more begin to occur with certainty when buffer widths reach 50'. The graphic also shows that the lower limit of 70% occurs for every instance when 100' of buffer is in place. The 100' line seems to be the bottom width for which 80-100% removal occurs.	A significant % of sediment in surface flows may be removed in a 14-30' buffer, but sediments may be more consistently remove by buffers of 30-100'. Course sediments are likely removed efficiently in the first 16-66' of a buffer and removal of finer particles may require buffer of at least 66'. Sediment removal efficiency decreases as slope increases. Wider buffers also may be necessary to maintain sediment removal efficiencies over time as buffers become saturated with sediments.
Removal of Total Phosphorous (TP)	In shallow slope situations, a 50' buffer seems to be sufficient, but as slope increase, a wider buffer (100') seems to be warranted. …50' again marks the transition between relatively low TP removal and (with a few exceptions) higher removal (>65%).	Much of the phosphorous may be removed with the first 13-30' of the buffer, but phosphorous may be more consistently removed by buffers of 30-100'. Buffers can become saturated with phosphorous and generally cannot provide long term storage of phosphorous…

Removal of Nitrogen	Although Figure 3 shows that substantial subsurface nitrate reduction can occur in buffers less than 50', consistent reduction over 75% are virtually assured over 50' and rise to the 90%+ range when 100' of buffer are provided. The increase in surface nitrate removal with an increase [in buffer width] from 50' to 100' is about 15%...	…narrow buffers, 3.3-49.2', can be effective at removing nitrogen, but wider buffers, >164', more consistently remove significant amounts of nitrogen. …50%, 75%, and 90% nitrogen removal efficiencies…would occur in buffers of approximately 10', 92', and 367' wide, respectively, depending on buffer characteristics and nitrate loading rates. Based on a review of some of the same literature, Wenger (1999) suggested that a minimum of 50' is necessary for effective nitrogen removal… …Vidon and Hill (2004) found that a 50' buffer was effective at removing 90% of the nitrate at location with loamy soils…
Habitat for wildlife	(The following is a summary, not a quotation). A 200-300' buffer is needed to provide essential habitat for wetland associated species, especially if wetland has open water.	The Environmental Law Institute's (2003) review of the science found that effective buffer sizes for wildlife protection may range from 33 to more than 5000 feet, depending on the species. Birds: from 49' to over 5000' Mammals: between 98' and 600' Reptiles and Amphibians: ….core terrestrial habitat for reptiles associated with wetlands ranged between 417' and 948', and for amphibians 521' and 951'

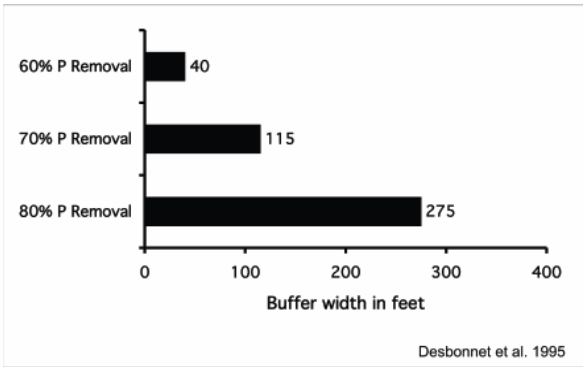
Adapted from "Scientific basis for buffer width requirements" by D. Konewko, S. Finwall, and G. Gaynor, April 2009, Memorandum: Wetland ordinance amendments – First reading, pp. 5-6, Table 1.

More detailed data can be found in these two guides that the city has available for review.

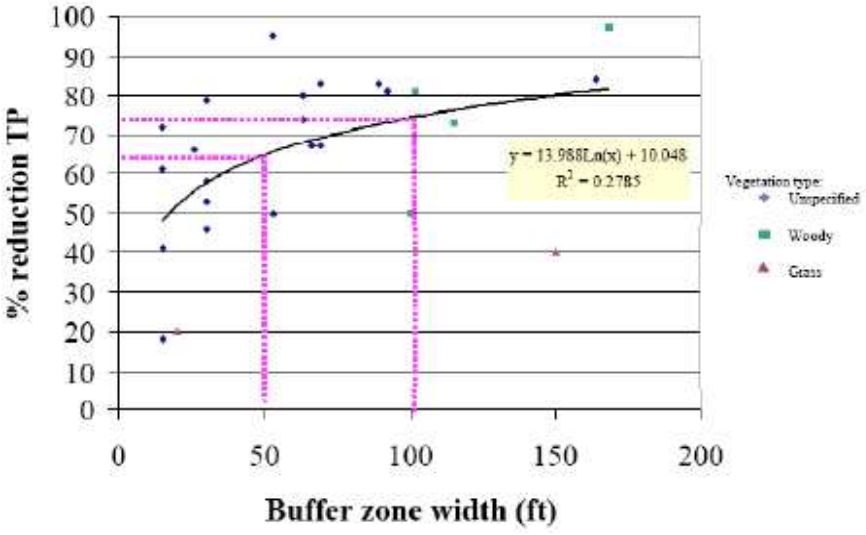
Particularly important for water quality, is the removal of excess nutrients and sediments carrying nutrients, particularly phosphorus, which is usually the limiting nutrient in surface waters, in order to slow down eutrophication and reduce algae growth (DeBarry, 2004; Radomski, 2009). Although removal efficiencies increase with buffer width, the removal efficiency increases less with each additional increase in buffer width (Radomski, 2009). Nevertheless, even small increases in pollutant removal can make a difference, especially for high quality wetlands and lakes that are at particular risk of degradation, such as the Manage A and Manage B wetlands adjacent lakes in Maplewood. For example, just "0.2 pounds of

phosphorus [added to a lake] can produce 100 pounds of algae" (Radomski, 2009, p. 21). As Figure 6 shows, buffer widths up to 100 ft provide increases in phosphorus removal capacities that are still reasonable in light of the required buffer widths increases.

Figure 6: Phosphorus Removal Efficiency and Buffer Widths



6a) Average buffer width required for 60%, 70%, and 80% phosphorus removal. Adapted from "Shoreland standards preliminary draft: Key proposals and their reasoning", by P. Radmoski, 2009, p. 23, http://files.dnr.state.mn.us/waters/watermgmt_section/shoreland/6120_draft_April_Key_Issues.pdf.



6b) Percentage of total phosphorous reduction as a function of buffer width. Adapted from "Shoreland standards preliminary draft: Key proposals and their reasoning", by P. Radmoski, 2009, p. 24, http://files.dnr.state.mn.us/waters/watermgmt_section/shoreland/6120_draft_April_Key_Issues.pdf.

Removal efficiencies not only depend on the buffer width, but also on the buffer slope and buffer vegetation. Buffers on deeper slopes are less efficient in removing pollutants, as the runoff flows faster over the area and is more difficult to intercept. Thus, higher buffer widths are required with increasing slopes (Ramdomski, 2009). Natural vegetation is required for buffers to function effectively. Lawn areas are ineffective as buffers. For example, "The "lawn to lake' shoreline allows 7 to 9 times more phosphorus to enter the lake than a more natural native vegetated shoreline" (Dennis, 1986; Bernthal, 1997; Graczyk et al., 2003; cited in Radomski, 2009, p. 21). A variety of different native vegetation is preferred over single species and non-native or even invasive plants.

Buffers also play an important role in providing wildlife habitat. Although habitat requirements differ among species, large native buffers are preferred, as they provide wide stretches of natural habitat for numerous species (Radomski, 2009). Optimal buffer widths can reach thousands of feet for some species (see Table 2). Thus, although wildlife benefits support wider buffer standards as well, it is unreasonable to base these standards on wildlife alone, as it no longer provides a reasonable balance between protection and shoreland uses.

Wetlands themselves also have important water quality functions, including storage of nutrients, filtering out and removing pollutants, settling of suspended sediments, catching surface runoff, and processing organic waste (U.S. EPA, 2008). Wetlands adjacent to lakes might not provide sufficient sediment settling capacity due to the surface water connection with the lake compared to freestanding wetlands. This emphasizes the need for sufficiently wide buffers that are capable of removing sediments efficiently. Wetlands adjacent lakes additionally protect the shoreline from erosion and sediment pollution originating from the shoreline (MN DNR, n.d.a). Overall, wetlands adjacent lakes play an important role in protecting the lake by filtering out

pollutants and wastes prior to the pollutants making contact with the open water. Natural vegetation along the shoreline provides additional protection from erosion (Radomski, 2009).

To maintain and protect the buffers and wetlands, activities on shoreland properties need to be restricted to reduce water pollution and protect natural vegetated buffers. The water quality functions in freestanding wetlands are different than wetlands adjacent to lakes, because there is no lake to be affected. The buffer around a wetland fulfills the same function for all wetland types, no matter whether freestanding or attached to a lake. However, the buffers of wetlands adjacent lakes protect not only the wetlands but also the lakes. Overall, larger buffers with natural vegetation, managed by people with an understanding of the buffer and the wetlands adjacent lakes, are considered to be more effective (Environmental Law Institute, 2008).

4.4 Social and Economic Differences

The main social differences with regard to wetlands adjacent lakes compared to freestanding wetlands are that the lakes and surrounding areas are valued differently and used primarily for recreational purposes. Property owners with access to lakes use their properties for swimming, boating, fishing, watercraft access, picnic areas, camping, campfires, landscaping, docks, and observing wildlife. The survey of affected Maplewood residents shows that they use their properties for watercraft access, recreation and picnic areas, campfires, and landscaping, as well as fishing from the shore, wildlife enjoyment, and enjoyment of the scenery. In contrast, freestanding wetlands are used for more passive recreation, such as wildlife and nature enjoyment. If a freestanding wetland is used in a recreational sense, it has a walking path usually raised above the wetland to avoid disruptions. The social value placed on freestanding wetlands usually focuses on wildlife, ecology, and scenic beauty.

Wetlands also fulfill important economic functions. In general, both types of wetlands provide commodities, such as fish, wild rice, berries, timber, and game (MN DNR, n.d.a). Freestanding wetlands can be used for crops and hunting practices, and this serves the commercial community a product that can be sold to the public (U.S. EPA, 2008). Wetlands adjacent lakes, in contrast, provide opportunities for commercial fishing. However, these commercial commodities play less of a role in urban settings, such as the city of Maplewood. Additionally, wetlands adjacent lakes and freestanding wetlands save cities a great deal of money because of its functions as pollutant filter and flood storage and control area (U.S. EPA, 2008).

Economic differences between wetlands adjacent lakes and freestanding wetlands also result from being differently valued and used for recreational purposes, as recreation and tourism are an important economic sector. Wetlands adjacent lakes support water-oriented recreational activities, such as fishing and boating, that can generate revenues. For example, sales of fishing licenses are important State revenues. Buffers along wetlands adjacent lakes also have economic significance. Studies have shown that natural greenways and buffers positively affect property values. In Colorado, prices for housing associated with greenbelts were up to 32% higher than without greenways (Correl et al., 1978; cited in Radomski, 2009). The MN DNR expects the same for buffers along shorelines (Radomski, 2009). Thus, it is reasonable to assume similar positive effects for buffers along wetlands adjacent lakes.

4.5 Conclusion

No matter whether the wetlands are freestanding or adjacent lakes, their ecological, wildlife, water quality, and economic and social benefits are of equal importance, even though their functions may differ. Whether the wetlands are freestanding or adjacent lakes, wetlands

have incredible value in the natural and physical world. “As wetlands continue to be lost, degraded, or isolated, the health and survival of many wildlife populations are at risk” (NCRS, 2006a, p.4). Both wetlands adjacent lakes and freestanding wetlands have important ecological functions and provide important habitat for wildlife, including aquatic species, birds, and plants. Wetlands adjacent lakes are particularly important as fish habitat, providing spawning grounds, food sources, and protection. Both freestanding and wetlands adjacent lakes with their buffers maintain and improve water quality by filtering contaminants, excessive nutrients and sediments. Additionally, wetlands adjacent lakes protect shorelands from erosion and trap contaminants and sediments running off from nearby uplands before they enter the adjacent lakes. Both types of wetlands provide a source of economically valuable products, such as animals from hunting and commercial fishing, and support recreational activities, which include fishing, hunting, nature appreciation, bird watching, and hiking. Recreational activities associated with wetlands adjacent lakes, however, typically require access or at least close proximity to the lake for fishing, boating, swimming, and other shoreland uses.

5.0 Proposed Minnesota Department of Natural Resources Shoreland Rules

The “Shoreland Rules Update Project” was initiated in 2007, when the Minnesota State Legislature directed the MN DNR to update the shoreland rule that were last revised in 1989 (MN DNR, 2008). The proposed rules exist currently as draft version, awaiting finalization.

5.1 Status of Proposed Rules and Expected Timeline for Completion

The latest version of the preliminary draft available on the MN DNR Web site for public review is dated April 20, 2009. Since then, the MN DNR worked on several revisions of the draft

rules. The latest revision, “Proposed Permanent Rules Relating to Shoreland Management,” is dated July 6, 2010. This version is not available online, but has been provided by Paul Radomski, Senior Project Consultant and Research Scientist for the Shoreland Management Program at the MN DNR, for the purpose of this project (see Appendix 5).

In August 2010, Governor Pawlenty returned the draft rules. The Governor’s primary concerns involved the sufficiency of local government flexibility, the problematic of the predominant “one-size-fits-all” approach, the difficulty of finding a balance between adequate protection and citizens’ rights to enjoy and use their properties, and the potential impacts of changing regulatory thresholds for basins near municipalities (MN DNR, 2010a).

To accommodate local governments that are working on amendments or new shoreland regulations until the final rules are passed, the “DNR will accept any local government's ordinance amendments that follow the draft rules as substantially meeting the statutory and regulatory requirements” (MN DNR, 2010a, p.1-2). As the draft rules are less stringent in certain elements than the current shoreland rules, municipalities can follow the draft rules if they make use of the flexibility provisions under the current rules by requesting flexibility approval from the DNR and demonstrating that the alternative approach still meets the original intent of the standards in the current rules (MN DNR, 2010a).

The official MN DNR Web site for the shoreland rule project has not been updated since August 2010. P. Radomski (personal communication, March 1, 2011) provided the following update on the planned completion of the shoreland rules:

- Following the 2010 Minnesota state elections, the MN DNR has a new leadership in the form of a new governor and new commissioner.
- Staff is currently updating the new leadership on the project.
- No decisions have been made regarding what will be done next or what the decision on the draft rules will be.

- Legal uncertainties are involved. The time limit for the rulemaking process in accordance with Minnesota state law requirements has been exceeded, so that it is currently questionable whether the current shoreland rulemaking process can be completed.

Furthermore, P. Radomski (personal communication, March 8, 2011) confirmed that the draft dated July 6, 2010 is the latest version the MN DNR created and will likely be the basis for any future revisions.

5.2 Major Proposed Parts Affecting the Regulation of Wetlands Adjacent Lakes

According to P. Radomski (personal communication, March 1, 2011), the issue of wetlands adjacent lakes has been considered in the development of the proposed shoreland rules. Based on the draft rules dated July 6, 2010 (MN DNR, 2010b), the main parts affecting the regulation of regulation of wetlands adjacent lakes include structure setback requirements from public water wetlands, shoreline buffer zone requirements, requirements for walkways across wetlands and for access lots, activity restrictions in wetlands, and special protection shoreland overlay district provisions and advanced subdivision standards. These are briefly described below. All references to draft rules and specific rule sections refer to the version dated July 6, 2010, unless otherwise noted.

Structure Setbacks from Wetlands

In accordance with the draft rules part 6120.3300, subp. 3, item A, subitem (3), a minimum structure setback of 75 ft is required “from public waters wetlands having surface water connections to public waters regulated under shoreland controls and located within a shoreland overlay district.” The setback is measured perpendicular from the transition zone from predominantly hydrophytic vegetation to predominantly terrestrial vegetation, consistent with the United States Army Corps of Engineers Wetland Delineation Manual of January 1987 (P.

Radomski, personal communication, March 9, 2011). This is designed to protect shallow and deep marshes and shallow open water/ponds (P. Radomski, personal communication, March 1, 2011), which are the types of wetlands typically found adjacent lakes.

Shoreline Buffer Zone

In accordance with the draft rules part 6120.3310, a minimum shoreline buffer of 50 ft is required. The proposed rules define a buffer as "land that is used to protect adjacent lands and waters from development and more intensive land uses. The land is kept in a natural state of trees, shrubs, and low ground cover and understory of plants and functions to filter runoff, control sediment and nutrient movement, and protect fish and wildlife habitat. (…)" (see part 6120.2850, subp. 13). The buffer covers all or part of the shore impact zone, which is the "land located between the ordinary high water level of public waters and a line parallel to it at a setback of 50 percent of the required structure setback, but not less than 50 feet" (see part 6120.2850, subp. 77).

Existing developments on "lots of record with structure" are regulated under part 6120.3310 subp. 6, and new developments on lots without pre-existing structures are regulated under part 6120.3310 subp. 7. For existing developments, the shore impact zone is protected as shoreline buffer, where intensive cutting is restricted. For new developments, a minimum buffer of 50 ft, measured perpendicular to the ordinary high water level, of natural vegetation consisting of "trees, shrubs, and low ground cover consisting of plants and understory" must be maintained. Within these shoreline buffer zones, clearing of natural vegetation is generally not allowed, with the exception of some limited vegetation removal to accommodate certain recreational uses and water-oriented access and accessory structures, as long as certain requirements are meet. In case

of violations, re-planting of natural vegetation is required. For new developments, restoration plans must be provided. (See also part 6120.3310 subp. 6 & part 6120.3310 subp. 7.)

As the buffer and shore impact zone are measured from the ordinary high water level, wetlands adjacent lakes are only protected by these shoreland buffer provisions if the ordinary high water level is on the landward side of the wetland. If the ordinary high water level is lakeward of the of the wetland adjacent lake, these provisions do not apply and the wetland is protected under the Wetland Conservation Act (WCA) (P. Radomski, personal communication, March 1, 2011).

Walkways and Access Lots

Walkways must be used if wetlands need to be crossed in order to reach the public water from the shore. According to the draft rules part 6120.3300, subp. 4a, item E, “walkways landward of the ordinary high water level must be used in place of fill to bridge wetland areas to reach the shore.” These walkways must be at least 16 inches above the wetland surface and no more than 8 ft wide. This provision is designed to minimize impacts of public water access on wetlands landward of the ordinary high water level, thus attempting a reasonable balance between wetland protection and public water access (P. Radomski, personal communication, March 1, 2011).

In accordance with the draft rules part 6120.4100, subp. 3, special access lots must provided for public water access where “direct riparian access is not feasible due to the presence of protected vegetation, extensive shallow water, wetlands, or other critical or wildlife habitat.”(See also MN DNR, 2010, Part 6120.3300, subp. 4a, item C for access lots in new development subdivisions.) This section protects wetlands adjacent lakes providing sensitive or

critical habitat, even if located landward of the ordinary high water level. The goal is to minimize disturbances for fish and other wildlife species and prevent bottom sediment suspension and resulting degradation due to watercraft activities in areas not suitable for this purpose (P. Radomski, personal communication, March 1, 2011). Additionally, as outlined in part 6120.4100, subp.4, item C, the selected access lots "must be suitable in their natural state for the intended activities" and required facilities "must be centralized and located in areas suitable for them." The suitability assessment must consider the presence of wetlands among other important environmental factors.

Activity Restrictions in Wetlands

In all wetlands in the shoreland overlay district, land alterations activities are restricted. According to the draft rules part 6120.3320, subp. 2, item K, "construction and other land alteration activities must avoid wetlands, unless authorized under chapter 8420." The restrictions are in accordance with the Wetland Conservation Act, Minnesota Rules Chapter 8420. This affects wetlands adjacent lakes both lakeward and landward of the ordinary high water level.

Special Protection Shoreland Overlay District and Advanced Subdivision Standards

Under the draft rules part 6120.3250, subp. 3 provisions are included authorizing local governments to create "special protection shoreland overlay districts." These might be used to protect shoreline sections with adjacent wetlands, as long as the intended purpose, required regulatory stringency, and establishment criteria for such districts are being met:

- Part 6120.3250, subp. 3, item A: "A special shoreland protection overlay district is intended to be used for three basic purposes. The first purpose is to limit and properly manage development in areas that are generally unsuitable for development or use due to flooding, erosion, limiting soil conditions, steep slopes, or other major physical

constraints. A second purpose is to manage and preserve areas with special historical, natural, or biological characteristics. A third purpose is to protect sources of drinking water for public water supply wells and surface water intakes."

- Part 6120.3250, subp. 3, item B: "Local governments may establish special protection shoreland overlay districts for sensitive shoreland areas and other vulnerable areas and these districts shall be regulated with controls that meet or exceed the natural environment class standard."
- Part 6120.3250, subp. 3, item C: "Criteria for establishing special protection shoreland overlay districts for portions of lake shorelands include vulnerable or nutrient-susceptible bays, areas adjoining inlets and outlets, and areas with broad and extensive littoral zones or wetland fringes."

The proposed rules also include provisions for "shoreland conservation subdivisions" to better conserve natural resources, including sensitive areas such as wetlands (see part 6120.4200, subpart 1). These provisions promote development designs that better conserve and protect natural areas, including clustering developments and low impact development (Radomski, 2009). The standards for the conservation subdivisions are outlined in the draft rules under part 6120.4200.

6.0 Recommendations for the Regulation of Wetlands Adjacent Lakes in Maplewood

From the research, wetlands adjacent lakes and freestanding wetlands need to be regulated the same, with buffers being just as strict for both, when regulated under the city's shoreland ordinance. Additional, future citizen participation is highly recommended.

6.1 Best Way to Regulate Wetlands Adjacent Lakes

The best way to regulate wetlands adjacent lakes needs to be assessed from ecological, wildlife, water quality, and social and economic standpoints.

Ecology

Based on the assessment of differences, wetlands adjacent lakes should be regulated just as strictly as freestanding wetlands from an ecological standpoint. According to the MN DNR (2011), shoreland areas provide a unique ecological zone that is required for certain plant and animal species, and a larger buffer area could expound on this fact to create more diverse and balanced species populations. As the citizen input shows, residents living along the wetlands also want healthy ecological and vegetation systems. Requiring the same buffers for wetlands adjacent lakes as for freestanding wetlands and upholding the same other buffer requirements would maintain the health of the ecological system of both the wetlands and the adjacent lakes.

Wildlife

The health of the wildlife system runs parallel with the health of the ecological system. Wildlife population health depends directly on the health of the wetland ecosystems. The research on wildlife function differences supports that restrictions on freestanding wetlands should be just as strict as on freestanding wetlands. All sorts of aquatic, semi-aquatic, and terrestrial species use the wetlands adjacent lakes for nesting, breeding, protection, and as food sources. Wildlife habitat quality increases with buffer width. However, existing developments need to be accommodated. Deer, duck, and geese population seem to flourish around wetlands adjacent lakes, indicating that reasonable buffers can be sufficient. Applying the current buffers for freestanding wetlands to wetlands adjacent lakes as well will strike a reasonable balance and preserve a healthy wildlife population.

Water Quality

Water quality of wetlands and wetlands adjacent lakes are each unique and serve a vital purpose for the health of the ecosystem and the aquatic and terrestrials and vegetation of these areas. Water quality in wetlands adjacent lakes should try to be maintained at the desired high levels in order to maintain the high quality of the Manage A and Manage B wetlands adjacent lakes. As supported by the research, when it comes to the water quality aspect, wetlands adjacent lakes should be regulated just as strictly as freestanding wetlands. The wetlands adjacent lakes should have a buffer of 75 ft to 100 ft, just like the corresponding classes of freestanding wetlands in Maplewood.

Social, Economic, and Recreational Aspects

Based solemnly on the research on social and economic functions, particularly the recreational aspects of the wetlands, the buffers should not be regulated as strict as for freestanding wetlands. Recreational functions are an important aspect of the wetlands adjacent lakes and hold a high value to the residents. This is consistent with the city's reasoning behind the reduced buffer widths adopted during the 2009 update of the wetland ordinance. However, if the lake, its adjacent wetland, and/or its shoreline are in poor quality, the recreational aspect will suffer and not be as valuable to the residents or the community. This, in contrast, supports just as strict regulation of wetlands adjacent lakes as of freestanding wetlands.

Social responsibility of the residents will require more education and workshops from the city of Maplewood to ensure the residents are informed as to what they need to do to protect and preserve the flora, fauna, and wildlife on their property so they can continue to be educated and become responsible and good environmental stewards to the wetlands and shorelands.

Overall Recommendation

If looking at all four of the aspects combined, wetlands adjacent lakes and freestanding wetlands should be protected the same when it comes to ecology, wildlife, water quality, and social and economic reasons. Thus, the current minimum buffer widths for Manage A and B wetlands adjacent lakes should be increased from 75 ft and 50 ft, to 100 ft and 75 ft, respectively. A buffer between 75 ft to 100 ft should provide ample protection for both wetlands adjacent lakes and freestanding wetlands. Although the city of Maplewood currently supports 50 ft buffers as absolute minimum, there is enough research to show that increasing buffers to 75 ft or 100 ft in most cases would greatly benefit the quality of wetlands.

Even though the research shows that the current buffers for wetlands adjacent lakes are strict enough to uphold the recreational aspects of the lakes, the buffers should be as strict as for freestanding wetlands to prevent a decline in the ecology, wildlife, and water quality, as such a decline would degrade the recreational aspects of the lakes. The recreational purposes do not outweigh the water quality, ecological, and wildlife issues; therefore, they do not justify the case of less strict buffers. If water quality, ecology, and wildlife are diminished by recreational activities, then the lake and shoreland will loose its appeal and ability to function for recreational purposes and enjoyment. As indicated by the questionnaire responses, water quality problems have already impacted recreational and other uses of the water bodies. For example, the affected lakes are generally not used for swimming. The wider the buffer, the more it will do for the water quality, ecology, wildlife, and in turn, recreational enjoyment.

Overall, the four aspects go hand in hand to create the beneficial quality of and prevent the degradation of the lakes and the wetlands adjacent them. This recommendation is also consistent with the city's overall goal "to ensure that the quality of buffers and wetlands

improves over time, rather than deteriorates" (Finwall, 2011, p.1). Reasonable activity restrictions, such as the ones agreed on by the city and affected residents during the 2009 update of the wetland ordinance, ensure that the majority of residential and recreational activities desired by the residents are possible on affected shoreland properties even with increased buffer widths requirements.

6.2 Proposal for Update of Maplewood's Shoreland Ordinance

Several updates to the city's shoreland ordinance are recommended in order to include the regulation of wetlands adjacent lakes.

Definitions

Definitions relating to wetlands adjacent lakes and their regulation need to be included in the shoreland ordinance. The definitions can be taken from Section 2 of the wetland ordinance (see Appendix 1) and can be either copied into or referenced by the shoreland ordinance. The latter has the advantage that future updates of these definitions would not have to be made in multiple ordinances.

Measurement of Wetland Buffers

Shoreland buffers and setbacks are typically measured from the ordinary high water level, which is considered to be the edge or boundary of the public water body. In accordance with the city's shoreland ordinance, the ordinary high water level is generally the elevation of "the highest water level that has existed for a sufficient time to leave evidence upon the landscape"

indicated by “natural vegetation changes from predominantly aquatic to predominantly terrestrial” (City of Maplewood MN, 2003, Sec. 44-1238).

In contrast, wetland buffers are measured from the wetland edge. Wetlands are delineated based on hydrology, soil conditions, and vegetation in accordance with the “Federal Manual for Identifying and Delineating Jurisdictional Wetlands” published by the U.S. Army Corps of Engineers, U.S. EPA, U.S. Fish & Wildlife Service, and U.S. Soil Conservation Service in 1989 (City of Maplewood, 2009b, p. 4). Thus, the edge of a wetland adjacent lake might differ from the ordinary high water level. For many of the wetlands adjacent lakes in Maplewood, the wetland edge is located landward of the ordinary high water level.

In order to avoid potential conflicts in the establishment of shoreline and wetland buffers and setbacks on shoreland properties with wetlands adjacent lakes, the shoreland ordinance needs to clarify which boundary is used for the measurement of buffers on these properties. Where wetlands adjacent lakes exist, it is recommended that the buffers is measured from the boundary – wetland edge or ordinary high water level – that is the furthest landward, as this would provide the best protection for both the shoreline and the wetland.

Wetland Buffers

In accordance with Maplewood’s wetland ordinance, a minimum buffer of 50 ft is needed. Studies reviewed for this project show that buffer widths of 75 ft to 100 ft may be more beneficial. Although a 50 ft buffer is the minimum needed for water quality control, increases to 75 ft or 100 ft can achieve reasonable improvements in pollutant removal efficiencies. Also, widths of 75 ft to 100 ft are particularly needed for high quality wetlands, such as the Manage A and Manage B wetlands adjacent lakes in Maplewood, which are more sensitive to degradation,

and to provide better wildlife habitats. The shoreland ordinance should use the definitions of wetland classes in the wetland ordinance (see Appendix 1), which are based on MnRAM, for the basis of buffer zones and set the buffer requirements for Manage A and Manage B wetlands adjacent lakes to 100 ft and 75 ft, respectively. Additionally, increased buffer widths for deep slope areas should be required in accordance with Section 4, Subsection c of the current wetlands ordinance (see Appendix 1), as buffer effectiveness decreases with increasing slope. Overall, the buffer and setback requirements for wetlands adjacent lakes in the shoreland ordinance should match the existing buffer requirements for freestanding wetlands:

Wetland Classification	Minimum Buffer Width	Structure Setback from Edge of Buffer
Manage A	100’	0’
Manage B	75’	0’
Manage C	50’	0’
[Stormwater Pond	10’	10’]

(City of Maplewood, 2009b, Section 4, Subsection a)

These buffer width recommendations are also consistent with the proposed MN DNR shoreland rules. The rules require a minimum shoreline buffer of 50 ft (MN DNR, 2010b). The recommended wetland buffers of 100 ft and 75 ft for Manage A and B wetlands adjacent lakes, respectively, will not conflict with this requirement when measured form the furthest landward boundary, ordinary high water level or wetland edge. Further, the proposed rules require a 75 ft minimum structure setback from the edge of wetlands adjacent lakes (MN DNR, 2010b). This would be achieved by the recommended buffer width for both Manage A and B wetlands adjacent lakes, which includes all of the affected wetlands in Maplewood.

Activity Restrictions and Other Requirements for Wetland Buffers

Freestanding wetlands and wetlands adjacent lakes should be regulated with the same standards and activity restrictions in order to maintain water quality. The standards, restrictions, and requirements outlined in Section 5 "Development and Construction," Section 6 "Activities in Wetlands (…) and Buffers," Section 7 "Best Management Practices," and Section 8 "Variances" of the current wetland ordinance (see Appendix 1) should be either copied into or referenced by the shoreland ordinance. Again, the latter would avoid the need to revise multiple ordinances if future changes are made to these provisions. The wetland ordinance restrictions are sufficiently strict to ensure good water quality and protection of wildlife habitats, but also reasonable enough to ensure that the rights of property owners are not infringed upon unnecessarily and most desired residential and recreational activities still possible.

Application to Both Public and Private Lands

The standards pertaining to the regulation of wetlands adjacent lakes should apply to both public and private lands. Although this is an implicit requirement, it should be emphasized in the shoreland ordinance. This will help avoid any future controversies about private property use restrictions and uses of publicly owned shoreland properties.

Special Protection Shoreland Overlay Districts

The proposed MN DNR provisions for the creation of special protection shoreland overlay districts might provide an opportunity to better protect currently undeveloped shoreland properties along wetlands adjacent lakes in Maplewood that might come under development pressures in the future and already developed properties from future pressures to increase

development densities. In accordance with Maplewood's 2030 Comprehensive Plan, wetlands are not in danger of being developed and the open space around Spoon Lake and the existing park along Wakefield Lake are planned to be maintained (City of Maplewood MN, 2010, Figures 5.1 & 5.2). However, some areas close to the wetlands adjacent Kohlman and Beaver Lakes are available for future developments (City of Maplewood MN, 2010, Figures 5.1 & 5.2). Special protection shoreland overlay districts could be established for these areas in order to ensure proper protection of these wetland and shoreland areas by restricting developments to low-impact designs.

The fully developed area around Lake Oehrline and the residential areas along the wetlands adjacent Beaver Lake and Wakefield Lake might also come under pressure to be more densely developed in the future. Special protection overlay districts might be used to limit densities of both new developments and redevelopments. In general, more stringent development standards in these special protection districts might be applied to all major redevelopments involving the new construction of residences and other main structures. It is important to note that the provisions for special protection shoreland overlay districts have not yet been finalized. Thus, the recommendations presented here are tentative, awaiting the finalization of the new MN DNR Shoreland Rules.

6.3 Recommended Future Citizen Participation

In addition to gathering more representative input of the affected residents, it is important to promote their active participation, both in the public policy process and in the shoreland and wetland conservation process.

Shoreland Property Owner/Resident Input

As only limited resident input could be gathered within the scope and timeframe of this project, it might be beneficial to send out additional surveys to gather more representative and precise information for the update process of the shoreland ordinance. To avoid duplicate effort and allow broader input, the survey could be targeted for all shoreland properties and not be limited to properties with wetlands adjacent lakes. Additionally, focus groups could be created for the residential areas at Beaver Lake, Lake Oehrline, and Wakefield Lake. Citizen input received during this project indicates that affected residents are interested in voicing their opinions and concerns and willing to form groups to address the issues at hand. These focus groups can be used to disseminate information, gather feedback, address citizen concerns, and encourage active participation in the public policy and preservation process.

Public Participation in Legislative and Regulatory Process

In order to promote more educated participation of the affected residents in the process of updating the shoreland ordinance, residents should have the opportunity to become better informed about the issue at stake. For the ordinance update as it relates to wetlands adjacent lakes, residents should be educated about the following issues:

- What are wetlands adjacent lakes? How do these wetlands look?
- What is the importance of these wetlands? How do they differ from freestanding wetlands?
- How are these wetlands affected by human development and lake and shoreland use? Why is it important to regulate these wetlands?

- What is the purpose of including the regulation of wetlands adjacent lakes into the shoreland ordinance?
- What impact will the regulation of wetlands adjacent lakes under the shoreland ordinance have on shoreland properties?

This information can be disseminated to affected residents and property owners through brochures, Web pages, seminars, and focus groups. Sufficient time should be allowed for all residents and property owners to access and review the information prior to the public hearings to ensure informed participation of all the affected and involved parties.

Workshops

Workshops are useful to educate residents and owners of shoreland properties about how to best manage the valuable natural resources of shorelands and wetlands. The majority of residents that responded to the questionnaire were in favor of such workshops. Workshops could address the following:

- Best management practices for landscaping, beautification, and residential and recreational uses of shoreland properties.
- Hands-on-training for easy-to-do shoreland and wetland restoration projects.
- Financial incentives and programs available for shoreland restoration, such as the MN DNR's Shoreland Habitat Restoration Grant Program (http://www.dnr.state.mn.us/grants/habitat/shoreland.html).
- Available technical assistance, such as the MN DNR's "Restore your Shore" online multimedia program (http://www.dnr.state.mn.us/restoreyourshore/index.html).

Overall, the goal of such workshops should be not only to educate, but also to encourage residents and property owners to implement easy restoration practices in their own backyards. Including children in hands-on workshops is especially beneficial, as they play a huge role in encouraging their parents to do similar projects at home.

7.0 Conclusion

In conclusion, this Capstone Project aims at assisting the city of Maplewood with their ongoing wetland and shoreland debate as it relates to wetlands adjacent lakes. Based on the research conducted for this project as described in this paper, the UMUC team concludes that wetlands adjacent lakes should be regulated just as strictly as freestanding wetlands when included in the shoreland ordinance. The buffer widths currently set for freestanding wetlands and the activity restrictions and other buffer requirements outlined in the current wetland ordinance are both adequate and reasonable to maintain the health and functions of the wetlands adjacent lakes. In the Maplewood community, these wetlands are a vital part of the shoreline and shoreland ecosystems and provide important wildlife habitat and vital water quality functions for these ecosystems. Further, there are many economic and social values, particularly in terms of recreational uses, that these wetlands hold within the community. All these factors make wetlands adjacent lakes a valuable natural resource that is worth being protected. Natural buffers with native shrubs and trees play a central role in protecting these wetlands and the lakes. Just as the city of Maplewood's wetland ordinance is designed to ensure the protection of its wetlands and streams from degradation, pollution, and the acceleration of aging, the updated shoreland ordinance should ensure the same for wetlands adjacent lakes by providing equally stringent protection for these wetlands as the wetland ordinance provides for freestanding wetlands.

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APPENDICES

Appendix 1: Maplewood Wetland Ordinance

ORDINANCE NO. 895

AN ORDINANCE AMENDING THE ENVIRONMENTAL PROTECTION AND CRITICAL AREA ARTICLE OF THE CITY CODE

The Maplewood City Council approves the following changes to the Maplewood Code of Ordinances:

This amendment revises portions of Article VII. (Environmental Protection and Critical Area) dealing with wetlands.

Section 1. Findings.

a. Wetlands serve a variety of beneficial functions. Wetlands help maintain water quality by filtering suspended solids and pollutants. They reduce flooding and erosion, provide open space for human interaction, and are an integral part of the city's environment. Depending upon their type, size, and location within a watershed, they represent important physical, educational, ecological, aesthetic, recreational, and economic assets of the city. Properly managed wetlands are needed to support the city's efforts to reduce flooding and to protect the public health, safety, and general welfare.

b. Wetlands and buffers provide habitat for aquatic, semi-aquatic, and terrestrial wildlife, including rare, threatened, or endangered species. They provide breeding, nesting and feeding grounds for many forms of plant and animal life. Many species of wildlife require both wetlands and their associated upland buffers for survival. Protecting wetlands and buffers is essential for preserving the diversity of plant and animal species in the city.

c. Streams are also significant elements of the city's hydrologic system. Streams flow into wetlands and lakes, provide food and habitat for wildlife, provide open space, and are an integral part of the city's environment. Like wetlands, streams are an important physical, ecological, aesthetic, recreational, and economic asset.

d. Various existing state and federal laws restrict activities and development within wetlands and streams. The city finds that development adjacent to and surrounding wetlands may also degrade and pollute wetlands or accelerate the aging or elimination of wetlands and that development next to streams may degrade, pollute, or damage streams and, in turn, degrade other surface waters downstream. Regulating development and land use around wetlands and streams is therefore in the public interest.

e. As defined and used herein, buffers are land areas adjacent to wetlands and streams that are deemed important for maintaining the health and valuable functions of such wetlands and streams. Restricting development of and land use in buffers recognizes that the surrounding upland impacts the quality and functions of wetlands and streams and, therefore, is in the public interest.

f. Buffers planted with native or naturalized vegetation serve the following functions:

(1) Stabilize soil and prevent erosion.

(2) Preserve and enhance the quality of surface water by reducing the input of suspended solids, nutrients, and harmful chemical substances that may adversely impact public health or aquatic habitat.

(3) Filter suspended solids, nutrients, pollutants, and harmful substances so that they do not enter the wetland or stream.

(4) Moderate water level fluctuations during storms.

(5) Protect beneficial plant life and provide habitat for wildlife.

(6) Provide shade to reduce the temperature of both stormwater runoff and the wetland, thereby helping to maintain the conditions for healthy aquatic life.

(7) Reduce the adverse impacts of human activities on wetlands and streams and thereby preserve them in a natural state.

g. In addition to regulating development and land use around wetlands, this ordinance is intended to educate the public (including appraisers, owners, potential buyers, and developers) about the importance of wetlands and streams and the functions of buffers and to encourage property owners who live adjacent to and/or near wetlands and streams to be responsible stewards by managing and enhancing the quality of buffers as hereinafter described.

Section 2. Definitions.

The following words, terms, and phrases when used in this ordinance shall have the meanings ascribed to them in this section, except where the context of the word, terms, and phrases clearly indicates a different meaning.

Administrator means the director of the community development department or other person or persons charged with the administration and enforcement of this ordinance.

Alteration means human action that adversely affects the vegetation, hydrology, wildlife or wildlife habitat in a wetland, stream or buffer, including grading, filling, dumping, dredging, draining, paving, construction, application of gravel, discharging pollutants (including herbicides and pesticides), and compacting or disturbing soil through vehicle or equipment use. Alteration also includes the mass removal or mass planting of vegetation by means of cutting, pruning, topping, clearing, relocating, or applying herbicides or any hazardous or toxic substance designed to kill plant life. Alteration does not include the following activities in a buffer:

a. Walking, passive recreation, fishing, or other similar low-impact activities.

b. The maintenance of pre-existing, nonconforming lawn area.

c. The removal of trees or vegetation that is dead, dying, diseased, *noxious*, or hazardous in a manner that does not cause the compacting or disturbing of soil through vehicle or equipment use.

d. The removal of *noxious* weeds by non-chemical methods, or by means of chemical treatment in accordance with application methods that prevent the introduction of toxic chemicals into wetlands and streams.

e. The removal of non-native shrubs, such as buckthorn, if:

1. there is little chance of erosion; and
2. site is flat or generally has slopes less than 6 percent grade; and
3. cut and treat method of removal is used on shrubs more than one-half (½) inches in diameter (not pulling).

f. *Selective* management of vegetation as follows:

1. *Selective* pruning of trees or shrubs in order to enhance their health.
2. *Selective* removal of tree saplings (less than 2 inches in diameter) in order to enhance wildlife value of the buffer.
3. *Selective* removal of non-native trees.
4. *Selective* removal of non-native weeds.
5. *Selective* seeding or planting of vegetation that is native to Minnesota.

g. Installation of temporary fencing without footings.

h. Projects within the buffer that are the subject of a wetland buffer management worksheet approved by the administrator.

Best management practices (BMP's) mean measures taken to minimize negative effects of stormwater runoff on the environment including, but not limited to, installation of rain gardens, infiltration basins, infiltration trenches, retention basins, filters, sediment traps, swales, reduction of impervious surfaces, planting of deep-rooted native plants, landscape and pavement maintenance.

Buffers are land areas adjacent to wetlands and streams in which development and land use are restricted as set forth herein and in which the growth of native and naturalized plants and trees are to be preserved and encouraged in accordance with this ordinance.

Clearing means the cutting or removal of vegetation.

Enhancement means an action that increases the functions and values of a wetland, stream, or buffer.

Erosion means the movement of soil or rock fragments, or the wearing away of the land surface by water, wind, ice, and gravity.

Infiltration basin means a pond or basin that captures stormwater and allows it to soak into the ground. An infiltration basin will typically drain within forty-eight (48) hours of a storm event.

Lake means an area of open, relatively deep water that is large enough to produce a wave-swept shore. Lake shall also be defined as a "public water" as delineated and listed in the city's shoreland ordinance (Article IX).

Large-scale project means a vegetation maintenance, control, removal, mitigation or restoration project that will affect more than fifty percent (50%) of a buffer located on a piece of property.

Lawn area means that area within a buffer with maintained landscape, including areas of mowed turf grass, gardens, play areas, work areas, patios, play structures, and nonpermanent structures. Lawn area does not include: (1) areas within a buffer consisting of native or naturalized vegetation; and (2) the land area that is outside of a buffer.

Minnesota Routine Assessment Method (MnRAM) is a scientific methodology to assess the quality of wetlands.

Mitigation means an action that reduces, rectifies, eliminates, or compensates for the alteration of a buffer or wetland.

Native area means an area where native vegetation exists.

Native vegetation means tree, shrub, grass, or other plant species that are indigenous to the Twin Cities metropolitan area and that could have been expected to naturally occur on the site. Native vegetation does not include *noxious* weeds.

Naturalized area means an area where naturalized vegetation exists and does not include a lawn area.

Naturalized vegetation means tree, shrub, grass, or other plant species that exists on a site naturally without having been planted or maintained as a lawn area. It may be a native or non-native species.

Nonconforming lawn area means that area within a buffer with maintained landscape (lawn area) as of the date of adoption of this ordinance. Once a nonconforming lawn area is converted to native or naturalized buffer, it loses its legal nonconforming status and may not thereafter be treated as a nonconforming lawn area.

Noxious weed means plants listed as prohibited noxious weeds in the Minnesota Noxious Weed Law. (See also weed.)

Ordinary high water mark (OHWM) means a mark delineating the highest water level maintained for enough time to leave evidence upon the landscape. The ordinary high water mark is commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Public waters means water basins assigned a shoreline management classification by the Minnesota Department of Natural Resources commissioner under Minnesota Statutes, sections 103F.201 to 103F.221, except wetlands less than 80 acres in size that are classified as natural environment lakes.

Rain garden means an infiltration basin that is planted as a garden that allows water to infiltrate within forty-eight (48) hours of a storm event.

Restoration means restoring a wetland, stream, or buffer in whole or in part to a condition that is similar to that before development of the surrounding area.

Selective means vegetation management done in a naturalized or native buffer, where a minimal amount of vegetation is altered, with the goal of improving ecological quality of the buffer and/or its ability to filter stormwater runoff.

Semipublic means land that is maintained by a private organization for public use.

Setback means the minimum horizontal distance between a structure and the nearest edge of the wetland, stream, or buffer.

Slope means the inclination of the natural surface of the land from the horizontal; commonly described as a ratio of the length to the height.

Stormwater pond means a pond that has been created to capture stormwater runoff. It is a natural wetland. Stormwater is often piped into stormwater ponds but may also enter through sheet runoff.

Stormwater pond edge means the normal high water level for a stormwater pond.

Straight-edge setback is a measurement to determine the allowable setback of an addition to an existing house, garage, deck or driveway which is located closer to or within the required buffer. Straight-edge setback additions are measured by using the existing edge of the house, garage, deck, or driveway located nearest to the edge of a buffer, wetland, or stream and extending that line in a parallel direction. No portion of the addition can encroach closer to the edge of a buffer, wetland, or stream than the existing structure.

Stream means those areas where surface waters produce a defined channel or bed. A defined channel or bed is land that clearly contains the constant passage of water under normal summer conditions.

Structure means anything constructed or erected that requires location on the ground or attached to something having location on the ground.

Sustainable design means a development design which minimizes impacts on the landscape.

Temporary erosion control means methods of keeping soil stable during construction or grading. Temporary erosion control measures include, but are not limited to, silt fencing, erosion control blankets, bale slope barriers, or other best management erosion control methods approved by the city.

Variance means a deviation from the standards of this ordinance that is not specifically allowed.

Vegetation means any plant life growing at, below, or above the soil surface.

Weed means a plant which causes damage in some way to native vegetation or ecosystems. (See also noxious weed.)

Wetlands means those areas of the city inundated or saturated by groundwater or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas as defined. Where a person has removed or mostly changed the vegetation, one shall determine a wetland by the

presence or evidence of hydric or organic soil and other documentation of the previous existence of wetland vegetation such as aerial photographs. This definition does not include lakes or stormwater ponds as herein defined.

Wetlands adjacent to lakes means those areas of land or vegetation that have been classified as wetlands by an applicable Watershed District in accordance with the Minnesota Routine Assessment Method (MnRAM) system but which are attached to or part of the edge of a lake as defined herein.

Wetland classes are defined follows:

a. *Manage A* wetlands are based on the "Preserve" wetland classification as defined in MnRAM. These wetlands are exceptional and the highest-functioning wetlands in Maplewood.

b. *Manage B* wetlands are based on the "Manage 1" wetland classifications as defined in MnRAM. These wetlands are high-quality wetlands.

c. *Manage C* wetlands are based on the "Manage 2" wetland classifications as defined in MnRAM. These wetlands provide moderate quality.

d. *Stormwater Pond* – These are ponds created for stormwater treatment. A stormwater pond shall not include wetlands created to mitigate the loss of other wetlands.

Wetland functions mean the natural processes performed by wetlands. These include providing wildlife food and habitat, maintaining the availability of water, purifying water, acting as a recharge and discharge area for groundwater aquifers, moderating the flow of surface water and stormwater, and performing other functions including but not limited to those set out in U.S. Army Corps of Engineers regulations.

Wetland buffer management worksheet is a printed form available through the community development department which is required to be completed by a property owner who wishes to undertake certain activities in a wetland or stream buffer. The activities proposed by the property owner on the worksheet must be approved by the administrator prior to any work in the buffer.

Wetland or stream edge means the line delineating the outer edge of a wetland or stream. The wetland edge shall be established using the Federal Manual for Identifying and Delineating Jurisdictional Wetlands dated January 10, 1989, and jointly published by the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the U.S. Soil Conservation Service, or succeeding publication that is adopted by the Federal Government. The applicable watershed district must verify this line.

Section 3. Applicability and Effective Date.

a. **Applicability.**

1. This ordinance shall take effect after the city publishes it in the official newspaper.

2. Except as specified elsewhere in this ordinance, this ordinance shall apply to all real property which is located in a wetland, stream, or buffer or any person or use that would alter a wetland, stream, or buffer after adoption of this ordinance (December 14, 2009).

3. The city adopts the wetland classification map dated December 14, 2009, which is based on wetland classifications from the MnRAM studies and assigned by the applicable watershed district. Other wetland classification regulations are as follows:

   a. The city council will adopt changes to the wetland map which are based on MnRAM studies conducted and approved by watershed districts.

   b. Any wetland not currently assigned a classification based on MnRAM studies as of the date of the adoption of this ordinance (December 14, 2009) shall carry over the city's April 24, 1995, wetland classifications and shall be assigned the following management classes:

      1) Class 1 wetlands are defined as Manage A wetlands.

      2) Class 2 wetlands are defined as Manage A wetlands.

      3) Class 3 wetlands are defined as Manage B wetlands.

      4) Class 4 wetlands are defined as Manage C wetlands.

      5) Class 5 wetlands are defined as stormwater ponds.

   c. Wetlands adjacent to lakes will be regulated by this ordinance until December 31, 2012, or until the city adopts a new shoreland ordinance that includes the regulation of these wetlands, whichever occurs first.

   d. Appeals to the wetland classifications are within the jurisdiction of the applicable watershed district and shall be filed and heard pursuant to the administrative review process of that district. In the event that an appeal is granted, the city will recognize the results of that appeal for purposes of the classification of wetlands within the city.

4. When any provision of any ordinance conflicts with this ordinance, the provision that provides more protection for buffers, wetlands, or streams shall apply unless specifically provided otherwise in this ordinance. This also applies to the applicable watershed district regulations.

b. **Exemptions.** This section does not apply to the following property located in the city limits of Maplewood:

1. Property which is located within a buffer, but is separated from the wetland or stream by an existing road.

2. Buildings and structures not in conformity with the regulations prescribed in this ordinance as of its effective date shall be regarded as nonconforming and may continue.

3. Lawn areas not in conformity with regulations prescribed in this ordinance as of its effective date shall be regarded as nonconforming and may continue. A nonconforming lawn area will lose its legal nonconforming status if it is converted to native or naturalized buffer and may not thereafter be treated as a lawn area.

Section 4. Buffer Widths and Requirements.

a. **Minimum buffers.** The following are the minimum required buffer widths and structure setbacks:

Buffer	**Wetland Classes**			
	Manage A & Streams	*Manage B*	*Manage C*	*Stormwater Pond*
Minimum Buffer Width	100 ft.	75 ft.	50 ft.	10 ft.
Structure Setback from Edge of Buffer	0	0	0	10 ft.

b. **Buffer measurement.** Buffers shall be measured from the wetland or stream edge.

c. **Buffers containing slopes.** For new development or construction on slopes greater than eighteen percent (18%) that are within a buffer, the buffer width shall be increased to ten (10) feet beyond the apex of the slope. Extension of the buffer for steep slopes shall apply to all wetland classes.

d. **Buffers for wetlands adjacent to lakes.** In light of the fact that lakes perform different functions than wetlands and streams and are used for different recreational purposes, wetlands adjacent to lakes and their designated buffers shall have alternative buffers. The following alternative buffers for wetlands adjacent to lakes will apply until December 31, 2012, or until the city adopts a new shoreland ordinance that includes the regulation of these wetlands, whichever comes first.

Buffer	**Wetland Classes (for Wetlands Adjacent to Lakes)**		
	Manage A	*Manage B*	*Manage C*
Minimum Buffer Width	75 ft.	50 ft.	50 ft.

e. **Average Buffers**: Recognizing that there are instances where, because of the unique physical characteristics of a specific parcel of land, the averaging of buffer width for the entire parcel may be necessary to allow for the reasonable use of the land during a development or construction project. In such cases decreasing the minimum buffer width will be compensated for by increased buffer widths elsewhere in the same parcel to achieve the required average buffer width.

1. The average buffer standards set forth below may be applied based on an assessment of the following:

   a) Undue hardship would arise from not allowing the average buffer, or would otherwise not be in the public interest.

   b) Size of parcel.

   c) Configuration of existing roads and utilities.

   d) Percentage of parcel covered by wetland.

   e) Configuration of wetlands on the parcel.

   f) Averaging will not cause degradation of the wetland or stream.

   g) Averaging will ensure the protection or enhancement of portions of the buffer which are found to be the most ecologically beneficial to the wetland or stream.

2. The following are the average buffer widths:

Buffer	**Wetland Classes**		
	Manage A & Streams	*Manage B*	*Manage C*
Minimum Buffer Width	75 ft.	50 ft.	50 ft.
Average Buffer Width	100 ft.	75 ft.	N/A

3. Average buffer measurement. Average buffer measurement shall be determined by averaging the buffer along the wetland edge situated on the subject property, not the entire wetland.

4. A mitigation plan is required for construction of development projects which meet the requirements described in Section 5.d. (Mitigation).

5. The appropriateness of using average buffers will be evaluated as part of the review of the contractor's or owner's development application. The average buffer used must be within the spirit and intent of this ordinance and must meet one or more of the requirements described in Section 7 (Best Management Practices).

6. The administrator must approve the average buffer.

7. If an average buffer is denied by the administrator, an applicant may appeal the denial by submitting a written appeal request to the administrator within fifteen (15) days of the administrator's written denial of the average buffer. The administrator shall send appeals of average buffers to the environmental and natural resources commission for review.

8. If an average buffer is denied by the environmental and natural resources commission, an applicant may appeal the denial by submitting a written appeal request to the administrator within fifteen (15) days of the commission's denial of the average buffer. The administrator shall send these appeals to the city council for final review.

Section 5. Development and Construction.

a. Unless an exemption applies, the following development and construction activities are **not** allowed in wetlands, streams, or buffers:

1. Alterations, including the filling of wetlands.

2. The construction of structures.

3. Projects which convert native or naturalized areas to lawn area.

4. The construction of stormwater drainage facilities, sedimentation ponds, infiltration basins, and rain gardens within a buffer.

5. Discharge of stormwater to a wetland not in compliance with the city's stormwater management ordinance (Section 44-1245, or subsequent ordinances).

b. **Exemptions.** This section does not apply to the following activities in a buffer:

1. Walking, passive recreation, fishing or other similar low-impact activities.

2. The maintenance of pre-existing, nonconforming lawn area.

3. The removal of trees or vegetation that is dead, dying, diseased, *noxious*, or hazardous in a manner that does not cause the compacting or disturbing of soil through vehicle or equipment use.

4. The removal of *noxious* weeds by non-chemical methods, or by means of chemical treatment in accordance with application methods that prevent the introduction of toxic chemicals into wetlands and streams.

5. The removal of non-native shrubs, such as buckthorn, if:

a) there is little chance of erosion; and
b) site is flat or generally has slopes less than 6 percent grade; and
c) cut and treat method of removal is used on shrubs more than one-half (½) inches in diameter (not pulling).

6. *Selective* management of vegetation as follows:

a) Selective pruning of trees or shrubs in order to enhance their health.
b) Selective removal of tree saplings (less than 2 inches in diameter) in order to enhance wildlife value of the buffer.
c) Selective removal of non-native trees.

d) Selective removal of non-native weeds.
e) Selective seeding or planting of vegetation that is native to Minnesota.

7. Installation of temporary fencing without footings.

8. Projects within the buffer that are the subject of a wetland buffer management worksheet approved by the administrator.

9. Public or semi-public streets and utilities. The city council may waive the requirements of this ordinance for the construction or maintenance of public or semipublic streets and utilities through buffers where it determines that there is a greater public need for the project than to meet the requirement of this ordinance. In waiving these requirements the city council shall apply the following standards:

a) The city may only allow the construction of public or semipublic utilities and streets through buffers where there is no other practical alternative.

b) Before the city council acts on the waiver the planning commission and the environmental and natural resources commission shall make a recommendation to the city council. The planning commission shall hold a public hearing for the waiver. The city shall notify the property owners within five hundred (500) feet of the property for which the waiver is being requested at least ten (10) days before the hearing.

c) Utility or street corridors shall not be allowed when endangered or threatened species are found in the buffer.

d) Utility or street corridors, including any allowed maintenance roads, shall be as far from the wetland as possible.

e) Utility or street corridor construction and maintenance shall protect the wetland and buffer and avoid large trees as much as possible.

f) The city shall not allow the use of pesticides or other hazardous or toxic substances in buffers or wetlands; however, in some situations the use of herbicides may be used if prior approval is obtained from the administrator.

g) The owner or contractor shall replant utility or street corridors with appropriate native vegetation, except trees, at preconstruction densities or greater after construction ends. Trees shall be replaced as required by city ordinance.

h) Any additional corridor access for maintenance shall be provided as much as possible at specific points rather than to the road which is parallel to the wetland edge. If parallel roads are necessary they shall be no greater than fifteen (15) feet wide.

i) The city council, upon recommendation of the administrator, may require additional mitigation actions as a condition of granting the waiver.

10. Public or semipublic trails. The city may waive the requirements of this ordinance for the construction or maintenance of public or semipublic trails through buffers, and boardwalks in wetlands, where it determines that there is a greater public need for the project than to meet the requirement of this ordinance. In waiving these requirements the city shall apply the following standards:

    a) Trails shall not be allowed when endangered or threatened species are found to be present in the buffer.

    b) Buffers shall be expanded, equal to the width of the trail corridor.

    c) The owner or contractor shall replant all disturbed areas next to the trail in a timeframe approved by the city.

    d) All necessary erosion control measures must be in place before constructing a trail. The erosion control measures must also be maintained and inspected by the city to ensure that the wetland or stream is not compromised by trail construction activities.

    e) The trail must be designed and constructed with sustainable design methods.

    f) Boardwalks are allowed within the buffer and shall be a maximum of six (6) feet in width for semipublic use and twelve (12) feet in width for public use.

    g) The administrator may require additional mitigation actions as specified in Section 5.d. (Mitigation).

c. **Construction Practices**. Special construction practices shall be required on projects or developments adjacent to wetlands and adjacent to and in their buffers. Special construction practices shall be approved by the administrator before issuance of a grading or building permit. Such practices may include, but are not limited to, grading, sequencing, vehicle tracking platforms, additional silt fences, and additional sediment control. They may also include the following:

    1. Wetland Buffer Sign Standards: The city may require that a property owner or developer install wetland signs before grading or starting construction. The buffer will be identified by installing wetland signs on the boundary between a buffer and adjacent land. These signs shall mark the edge of the buffer and shall state there shall be no building, mowing, cutting, filling, or dumping beyond this point. These signs shall be installed at each lot line where it crosses a wetland or stream buffer, and where needed to indicate the contour of the buffer, with a maximum spacing of one-hundred (100) feet of wetland or stream edge.

    2. Erosion Control Installation: Before grading or construction, the owner or contractor shall put into place erosion control measures around the borders of buffers. Such erosion control measures must remain in place until the owner and contractor have finished all development activities that may affect the buffer.

3. Erosion Control Breaches: All erosion control measures must be maintained and inspected to ensure compliance and protection of wetlands, streams, and buffers. The owner or contractor shall be responsible for all erosion/sedimentation breaches within the buffer and shall restore impacted areas to conditions present prior to grading or construction activities.

4. Erosion Control Removal: After completion of grading or construction, the contractor or owner may remove the erosion control measures only after inspection and approval by the city and the applicable watershed district to ensure the areas affected have been established per requirements.

5. Platting: When platting or subdividing property, the plat or subdivision must show the wetland boundaries as approved by the applicable watershed district.

6. It is the responsibility of the owner to alleviate any erosion during and after completion of grading or construction. The owner or contractor must remove erosion control measures after final approved inspection by the city and the applicable watershed district.

d. **Mitigation.** For large-scale projects or new development or construction, the city requires mitigation when a property owner or contractor has altered or will alter a wetland or buffer. The property owner or contractor shall submit a mitigation plan to the administrator for approval. In reviewing the plan, the city may require one or more of the following actions:

1. Reducing or avoiding the impact by limiting the degree or amount of the action, such as by using appropriate technology.

2. Rectifying the impact by repairing, rehabilitating, or restoring the buffer.

3. Reducing or eliminating the impact over time by prevention and maintenance operations during the life of the actions.

4. Compensating for the impact by replacing, enhancing, or providing substitute buffer land at a two-to-one ratio.

5. Monitoring the impact and taking appropriate corrective measures.

6. Where the city requires restoration or replacement of a buffer, the owner or contractor shall replant the buffer with native vegetation. A restoration plan must be approved by the city before planting.

7. Any additional conditions required by the applicable watershed district and/or the soil and water conservation district shall apply.

8. A wetland or buffer mitigation surety, such as a cash deposit or letter of credit, of one hundred and fifty percent (150%) of estimated cost for mitigation. The surety will be required based on the size of the project as deemed necessary by the administrator. Funds will be held by the city until successful completion of restoration as determined by the city after a final inspection. Wetland or buffer

mitigation surety does not include other sureties required pursuant to any other provision of city ordinance or city directive.

Section 6. Activities in Wetlands, Streams, and Buffers.

a. **Unless an exemption applies, the following activities are not allowed in wetlands, streams, or buffers:**

1. Alterations, including the filling of wetlands.

2. The construction of structures.

3. Projects which convert native or naturalized areas to lawn area.

4. The construction of stormwater drainage facilities, sedimentation ponds, infiltration basins, and rain gardens within a buffer.

5. The discharging of stormwater to a wetland must comply with the city's stormwater management ordinance (Section 44-1245, or subsequent stormwater ordinances).

b. **Wetland buffer management worksheet.** A wetland buffer management worksheet is required for certain activities within a wetland and stream buffer:

1. The administrator must approve wetland buffer management worksheets.

2. If a wetland buffer management worksheet is denied by the administrator, an applicant may appeal the denial by submitting a written appeal request to the administrator within fifteen (15) days of the administrator's written denial of the average buffer. The administrator shall send appeals of average buffers to the environmental and natural resources commission for review.

3. If a wetland buffer management worksheet is denied by the environmental and natural resources commission, an applicant may appeal the denial by submitting a written appeal request to the administrator within fifteen (15) days of the commission's denial of the average buffer. The administrator shall send these appeals to the city council for final review.

c. **Exemptions.** This section does not apply to the following activities in a buffer:

1. Walking, passive recreation, fishing or other similar low-impact activities.

2. The maintenance of pre-existing, nonconforming lawn area.

3. The removal of trees or vegetation that is dead, dying, diseased, *noxious*, or hazardous in a manner that does not cause the compacting or disturbing of soil through vehicle or equipment use.

4. The removal of *noxious* weeds by non-chemical methods, or by means of chemical treatment in accordance with application methods that prevent the introduction of toxic chemicals into wetlands and streams.

5. The removal of non-native shrubs, such as buckthorn, if:

   a) there is little chance of erosion; and
   b) site is flat or generally has slopes less than 6 percent grade; and
   c) cut and treat method of removal is used on shrubs more than one-half (½) inches in diameter (not pulling).

6. *Selective* management of vegetation as follows:

   a) Selective pruning of trees or shrubs in order to enhance their health.
   b) Selective removal of tree saplings (less than 2 inches in diameter) in order to enhance wildlife value of the buffer.
   c) Selective removal of non-native trees.
   d) Selective removal of non-native weeds.
   e) Selective seeding or planting of vegetation that is native to Minnesota.

7. Installation of temporary fencing without footings.

8. Projects within the buffer that are the subject of a wetland buffer management worksheet approved by the administrator.

9. For properties that are zoned single or double-dwelling residential or are used as a single or double-dwelling residential use:

   a) The use, maintenance, and alteration of existing nonconforming lawn area for the purpose of outdoor enjoyment which may include gardening, nonpermanent structures (including such things as storage sheds under 120 square feet in area, swing sets and volleyball nets), impervious patios, or fire pits.

   b) Work within a wetland, stream, or buffer which was approved by the Minnesota Department of Natural Resources water permitting process and access to those areas by a trail which is limited to the width of the permit.

Section 7. Best Management Practices.

The city encourages and in some cases requires that best management practices be implemented to minimize negative effects of stormwater runoff on the environment and the loss of wildlife habitat when a property owner or contractor has altered or will alter a wetland, stream, or buffer. Best management practices may include the following:

a. **Restore buffer with native plantings**. For large-scale projects or new development or construction refer to Section 5.d. (Mitigation).

b. **Manage weeds in buffer**. Pursuant to state law, all weeds listed on the Minnesota *noxious* weed list must be controlled by the property owner. Owners are encouraged to control other weeds that are not on the *noxious* weed list but can threaten the health of a wetland. Submittal of a wetland buffer management worksheet is required for management of weeds within the native and naturalized areas of buffers, except for *selective* treatment. In addition, a management plan drafted by a professional

experienced in wetland and stream restoration may be needed for large-scale projects or new development including:

1. Target weeds.

2. Appropriate management techniques, including the use of chemical treatment if approved by the administrator as part of the management plan.

3. Management schedule.

4. Erosion control and reseeding if management will create large areas of dead vegetation.

5. Cash escrow or letter of credit to cover 150 percent of the required work.

c. **Reduce stormwater runoff and/or improve the quality of stormwater runoff entering a wetland or stream**. This may be achieved through the following strategies or other administrator approved best management practices for dealing with stormwater. These practices are to be located outside of the wetland buffer.

1. Reduce amount of pavement on site (i.e. fewer parking stalls, narrower driveways, shared parking with other businesses).

2. Use pervious pavement such as pavers or porous asphalt.

3. Use turf pavers or modified turf areas for overflow parking.

4. Install rain garden or infiltration basin.

5. Install rock trench or rock pit.

6. Install filter strip of grass or native vegetation.

7. Install surface sand filter or underground filter.

8. Install native plantings on site to reduce fertilizer use and improve infiltration.

9. Install a green roof on buildings.

10. Install grit chambers, sediment traps, or forebays.

Section 8. Variances.

a. **Procedures.** Procedures for granting variances from this ordinance are as follows:

1. The city council may approve variances to the requirements in this ordinance.

2. Before the city council acts on a variance the environmental and natural resources commission will make a recommendation to the planning commission, who will in turn make a recommendation to the city council. The planning commission shall hold a public hearing for the variance. The city shall notify

property owners within five hundred (500) feet of the property for which the variance is being requested at least ten (10) days before the hearing.

3. The city may require the applicant to mitigate any wetland, stream, or buffer alteration impacts with the approval of a variance, including but not limited to, implementing one or more of the strategies listed in Section 5.d. (Mitigation).

4. To approve a variance, the council must make the following findings as depicted in Minnesota Statutes, section 44-13:

   a) Strict enforcement would cause undue hardship because of circumstances unique to the property under consideration. The term "undue hardship" as used in granting a variance means the owner of the property in question cannot put it to a reasonable use if used under conditions allowed by the official controls; the plight of the landowner is due to circumstances unique to his property, not created by the landowner; and the variance, if granted, will not alter the essential character of the locality. Economic considerations alone are not an undue hardship if reasonable use for the property exists under the terms of this ordinance.

   b) The variance would be in keeping with the spirit and intent of this ordinance.

b. **Exemptions to Variances**. Variances are not needed for the following:

1. A nonconforming single or double-dwelling residential structure which loses its nonconforming status as described in Minnesota Statutes, section 462.357, subdivision 1(e) is allowed to be rebuilt on its same footprint in its entirety (including foundations and decks) in the buffer if the new single or double-dwelling family residential structure meets the following conditions:

   a) Best management practices are implemented to help protect the wetland as described in Section 7 (Best Management Practices). The administrator approves the location and best management practices through the building permit process.

   b) All other applicable building ordinance requirements are met.

2. A nonconforming manufactured home which is located within a wetland buffer can be replaced with a new manufactured home without approval of a variance as long as the replacement meets with the requirements of Minnesota Statutes, section 462.357, subdivision 1(a).

3. Additions to a nonconforming single or double-dwelling family house, garage, deck, or driveway using the existing straight-edge setbacks to a wetland or stream if the following apply:

   a) Property that is zoned single or double-dwelling residential or is being used as a single or double-dwelling residence.

b) There is no other reasonable alternative than encroachment toward the wetland or stream with the addition.

c) The new addition of the house, garage, deck, or driveway is a minimum of twenty-five (25) feet from the wetland or stream edge.

d) The process of constructing the addition does not cause degradation of the wetland, stream, or the existing buffer.

e) Mitigation actions must be met as specified in Section 5.d. (Mitigation).

Section 9. Enforcement.

The city reserves the right to inspect the site or property during regular city business hours or upon notice to the property owner or its designated representative one business day in advance if the inspection is to occur at a different time for compliance with this ordinance during development or construction or alteration pursuant to an approved wetland buffer management worksheet or plan.

The city shall be responsible for the enforcement of this ordinance. Any person who fails to comply with or violates any section of this ordinance may be charged with a misdemeanor and, upon conviction, shall be subject to punishment in accordance with misdemeanor level convictions as set by State Statute. The violator may be civilly fined and/or liable for restoration costs as well. All land use building and grading permits shall be suspended until the developer has corrected the violation. Each day that a separate violation exists shall constitute a separate offense.

The city council approved the first reading of this ordinance on November 9, 2009.

The city council approved the second reading of this ordinance on December 14, 2009.

Signed:

_____ _____

Will Rossbach, Mayor Date

Attest:

_____

Karen Guilfoile, City Clerk

Adapted from "Ordinance No. 895: An ordinance amending the environmental protection and critical area article of the city code (Wetland Ordinance)" by City of Maplewood MN, December 14, 2009, http://www.ci.maplewood.mn.us/index.aspx?NID=444.

Appendix 2: Resident Questionnaire

Questionnaire for
Maplewood Residents of Shoreland Properties
with Wetlands Adjacent Lakes

This questionnaire was developed by graduate students in the environmental management program at the University of Maryland University College, Graduate School of Management and Technology, for the Capstone Project conducted for the City of Maplewood, MN, in Spring 2011.

1. Which lake are you living at? _____

2. Please estimate the proximity of the wetland/lake to:

a) Your residence: _____ ft
b) Recreational structures (dock, gazebo, shed, etc.): _____ ft
c) Lawn area: _____ ft

3. Are you in any formal or informal group(s) involved in wetland protection, shoreland protection, wildlife preservation, or related subjects?

□ Yes.
□ No.
If yes, please describe: _____

4. What are you using your shoreland property for, besides as a residence?
(Please check all that apply.)

□ Access for/to motorized watercrafts
□ Access for/to non-motorized watercraft
□ Swimming
□ Recreation/picnic area
□ Campfires
□ Landscaping
□ Other: _____

5. What type of landscaping do you have on your shoreland property within about 100 feet of the wetland/lake?
(Please check/name applicable.)

a) Predominantly natural vegetation/landscape: □ Yes □ No
b) Large lawn area(s): □ Yes □ No
c) Rain garden(s): □ Yes □ No
If yes, how many: ____
d) Shoreline: □ Natural □ Altered
If altered, please describe alteration: _____
e) Fencing: □ Yes □ No
If yes, please describe the type of fencing used: _____
f) Other: _____

6. Do you favor or oppose the following?
(Please check appropriate box.)

	Favor	Oppose
a) More stringent buffer requirements to protect wetlands/lakes.	□	□
b) New developments near wetlands.	□	□
c) Allocating more city funds to ensure the quality of wetlands.	□	□
d) Landowner/resident workshops for managing shoreland areas and wetlands.	□	□
e) Regulation of wetlands adjacent lakes as part of shoreland regulations rather than wetland regulations.	□	□

7. How would you rate the following priorities relating to the regulation of wetlands adjacent lakes?
(Please mark appropriate rating.)

	High Priority	Priority	Neutral	Little Priority	No Priority
Land and wetland preservation	1	2	3	4	5
Promoting land development	1	2	3	4	5
Water quality protection	1	2	3	4	5
Wildlife protection	1	2	3	4	5
Recreational shoreland uses	1	2	3	4	5

Do you have any other priorities relating to wetlands adjacent lakes?

_____

_____

8. Have there been any issues with the wetland near you in terms of water quality problems, wildlife habitat destruction, or overall degradation of the wetland?

_____

_____

9. Have there been any activities or accidents near the wetland/lake that (could) have negatively affected the wetland, lake, and/or wildlife in the area?

_____

_____

10. Do you have any concerns/ideas regarding the regulation of wetlands adjacent lakes?

_____

_____

_____

_____

_____

_____

_____

Thank you for your participation.

Appendix 3: List of Maplewood Residential Properties with Wetlands Adjacent Lakes

Wakefield Lake (4 properties):

1712 Barclay Avenue, Maplewood, MN 55109

1742, 1748, 1752 Gulden Place, Maplewood, MN 55109

Beaver Lake (11 properties, 2 vacant):

1099 Lakewood Drive North (vacant), Maplewood, MN 55119

2357, 2351, 2347 (vacant), 2323, 2275, 2317, 2311, 2291, 2287 and 2249 Case Avenue, Maplewood, MN 55119

Oehrline Lake (25 properties)

2087, 2093 and 2027 Greenbrier Street North, Maplewood, MN 55117

2001 Lee Street North, Maplewood, MN 55117

686, 686, 670 and 660 Eldridge Avenue East, Maplewood, MN 55117

2170, 2166, 2160 2094, 2086, 2074, 2054, 2044, 2032, 2010 Edgerton Street North, Maplewood, MN 55117

1989, 1994 Payne Avenue North, Maplewood, MN 55117

666, 660, 650, 655, 661, 673 Belmont Lane East, Maplewood, MN 55117

Adapted from: S. Finwall, personal communication, March 2, 2011.

Appendix 4: Questionnaire Responses

1. Which lake are you living at?

	Number of Responses Received	Letters Returned (Vacant Lots)	Number of Sent Questionnaires
Wakefield Lake	2	-	4
Beaver Lake	7	2	11
Lake Oehrline	8	-	25
Total	17	2	40

2. Please estimate the proximity of the wetland/lake to:

a) Your residence:

Distance	Number of responses
50	3
70	1
75	2
125-150	1
140	1
200	1
250	1
300	5
400	1
500	1

No response: 0; Multiple answers: 0

b) Recreational structures (dock, gazebo, shed, etc.):

Distance	Number of responses
0	6 (dock in water)
25	1
40	2
250	1
400	1

No response: 6; Multiple answers: 1

c) Lawn area:

Distance	Number of responses
0	1
3	1
5	1
6	1
10	1
12-15	1
20	1
30	1
100	2
200	1
4000	1

No response: 5; Multiple answers: 0

3. Are you in any formal or informal group(s) involved in wetland protection, shoreland protection, wildlife preservation, or related subjects?

Yes	8
No	8
No Response	1

If answered yes, description of group(s):

- Informal group/association of property owners at Lake Oehrline for control of excess submerged vegetation (algae/weeds) *(4 respondents form Lake Oehrline)*
- Nature Conservancy and Natural Wildlife Federation *(1 respondent from Lake Oehrline)*
- At work – restoration of 55 acres of wetland and subsequent banking of credits; environmental education as volunteer work *(1 respondent from Lake Oehrline)*
- Wakefield Watch *(1 respondent from Wakefield Lake)*
- Lake Wapogasset Association (Wisconsin) *(1 respondent from Beaver Lake)*

Comment to "No Response":

- y/n Ramsey County Engineer; Maplewood Council some meetings.

4. What are you using your shoreland property for, besides as a residence?

Access for/to motorized watercrafts	1
Access for/to non-motorized watercraft	10
Swimming	-
Recreation/picnic area	6
Campfires	5
Landscaping	8

Other:

- Ice fishing *(1 respondent)*
- Fishing *(2 respondents)*
- Wildlife enjoyment *(3 respondents)*
- Aesthetics/scenery enjoyment *(1 respondent)*
- Lawn area *(1 respondent)*
- Leave it wild *(1 respondent)*

Comment(s):

- To swimming: Water is too polluted, thanks to decision to use Wakefield as a stormwater filter so Lake Phalen can be clean.

5. What type of landscaping do you have on your shoreland property within about 100 feet of the wetland/lake?

a) Predominantly natural vegetation/landscape:

Yes	13
No	1
No Response	3

Additional information provided: Natural vegetation along shoreline:

- 3-5 ft *(1 respondent)*
- 5-6 ft *(1 respondent)*
- Up to 10 ft *(1 respondent)*
- 12-15 ft *(1 respondent)*

b) Large lawn area(s):

Yes	13
No	1
No Response	3

c) Rain garden(s):

Yes	4
No	7
No Response	6

If answered yes, how many rain gardens:

Rain garden(s)	Respondents
1	3
2	1

d) Shoreline:

Altered	2
Natural	12
No Response	3

If answered yes, description of alteration:

- Stairway to dock *(1 respondent)*
- Rockwall prior to lake level increase *(1 respondent)*

If answered no or no response:

- Although much reed canary, we work on buckthorn removal *(1 respondent)*
- Native and non-native vegetation *(1 respondent)*

e) Fencing:

Yes	3
No	10
No Response	4

If answered yes, description of fencing type:

- 4ft high chain link along lake about 3-5 ft from shoreline *(1 respondent)*
- 3ft high wire fence to keep out geese *(1 respondent)*
- 18" wood fence to keep geese away *(1 respondent)*

f) Other:

---

6. Do you favor or oppose the following?

	Number of Respondents			
	in Favor	Opposing	In between responses	No Response
a) More stringent buffer requirements to protect wetlands/lakes.	6	9	-	2
b) New developments near wetlands.	3	13	1	-
c) Allocating more city funds to ensure the quality of wetlands.	9	6	-	2
d) Landowner/resident workshops for managing shoreland areas and wetlands.	13	2	1	1
e) Regulation of wetlands adjacent lakes as part of shoreland regulations rather than wetland regulations.	10	2	-	5

Additional comments provided:

- "Unsure" to option (a) *(1 respondent)*
- Question mark (?) to option (c) *(1 respondent)*
- "Water quality, not wetlands – more a job for the state" to option (c) *(1 respondent)*
- "I really do not know what shoreland is" to option (e) *(1 respondent)*
- "What does this mean?" to option (e) *(1 respondent)*
- Question mark (?) to option (e) *(2 respondent)*
- "No Idea" to option (e) *(1 respondent)*

7. How would you rate the following priorities relating to the regulation of wetlands adjacent lakes?

	Number of Respondents					
	High Priority	Priority	Neutral	Little Priority	No Priority	No Response
Land and wetland preservation	6	5	5	-	1	-
Promoting land development	-	1	5	4	7	-
Water quality protection	8	6	1	1	1	-
Wildlife protection	7	5	2	1	2	-
Recreational shoreland uses	1	5	6	3	2	-

Do you have any other priorities relating to wetlands adjacent lakes?

- Geese – would like population reduced.
- Deer – we have 12-16 regularly in yard. They don't cause problems but some fear future incidents with cars or kids.
- Shoot some deer! 28 this year. 42 next year.
- Clean up the debris from public fishing dock that ends up on shoreline.
- No private docks of structures for storage near shore. Unless large body of water & motorized, no docks or ramps.
- Water quality – reducing runoff of fertilizers etc. into water – we've had fish kill problems & weed overgrowth related to this.

- Education – involving local schools & scout groups.

- Ramsey county engineers using state standards are doing an excellent job.

- In the abstract, protecting land & wetlands is a great idea, but consideration must be given to the already developed land uses.

8. Have there been any issues with the wetland near you in terms of water quality problems, wildlife habitat destruction, or overall degradation of the wetland?

- Beaver Lake is so weedy from Memorial Day to Labor Day. Over last 10 years, it has been harder to fish because of weeds.

- *(Beaver Lake)* taken over by seaweeds in summer.

- I believe this "lake" *(Lake Oehrline)* was created as a drainage pond – not naturally fed. Very shallow. Becomes green late in the summer. Issues with controlling curly pond weed – whether to treat with chemicals pros/cons. Decisions being made by neighbors with limited information & diverse priorities.

- The city tried to drain down Oehrline's over 50% of average depths – once in December and once in April. Our sense of the city's judgment is dim. Either action would have been detrimental – and needless.

- Shoot some deer or make them pay taxes, then they'll leave.

- Neighbor has cut trees down & allowed them to fall into lake. Trimmed trees & bushes for better view.

- Stormwater drainage into the lake – I try to be sure that water off my lawn is as clean as possible, but the street water goes right in.

- No destruction of wetlands, but poor water quality due to city & county's decision to use a natural lake as a storm drain filter *(Wakefield Lake)*

- See above *(Water quality – reducing runoff of fertilizers etc. into water – we've had fish kill problems & weed overgrowth related to this).* In addition, a nearby meth lab polluted the lake & caused fish kill.

- Yes, but we've seen improvement in water quality & wildlife population since raingardens & swales were installed. *(Lake Oehrline neighborhood)*

9. Have there been any activities or accidents near the wetland/lake that (could) have negatively affected the wetland, lake, and/or wildlife in the area?

- There are 28 deer living around here *(Beaver Lake)*. You ponder the negative actions of these large rats.

- The activity described in #8 *(Neighbor has cut trees down & allowed them to fall into lake. Trimmed trees & bushes for better view).* However, the power & telephone lines or poles have also caused much damage. Usually because they have trimmed trees & bush with little concern to clean-up or maintain off roadways or walks.

- A large meth lab 8 years ago. Many wood ducks & other wildlife died. No treatment of the lake.

- Overflow storm drain runs unfiltered & directly into lake, creating silt, sand, fill in & degradation of water & lake bottom.

- No specific incidents that I know of. I'm sure it is affected by fertilizer & other runoff *(Lake Oehrline).*

10. Do you have any concerns/ideas regarding the regulation of wetlands adjacent lakes?

- There has to be a balance between preservation and recreation.

- Too many deer! How can a person garden when there are too many deer! A child was run over by a deer a few months ago. What happens when a deer hits a car on Lakewood Drive?

- Regulation for new development is sensible. Claims that massive alteration of shoreline will affect water quality for an 11-acre stormwater retention system like Oehrline's is dubious since 90-144 acres (the city is unsure of the acreage) runs into the drains that empty into the lake. I very much doubt that relandscaping less than 10 acres around the lake will impact its water quality significantly. I am unconvinced and therefore unsupportive of regulations for landowners in ours and in similar situations.

- There are 9 homes with private property on this lake *(Wakefield Lake).* The remainder is publicly owned. I have grave concerns that the city wants to regulate homeowner rights, but has not taken responsibility regarding public land & more specifically – regulated runoff from storm drains into lake.

- City should focus its land & wetlands protection efforts on undeveloped land or land which it can purchase and not try to turn-back the clock on development. Reasonable regulations on developed land is ok, but people should be able to use their land for the purpose for which it was developed. Extremely wide buffer zones on residential property don't make sense in light of residential uses. Also, people with houses on lakes (public waters) should be able to use the lakes.

- I would support more stringent buffer requirements only if it was part of a broader more comprehensive effort to reduce all sources of phosphorus contribution to lake water. In the case of Beaver Lake, most phosphorus coming into the lake is from street runoff over a wider area than the few homeowners of lake property.

- Watershed districts or controllers seem to be multiplying. Just for revenge of fees. Government or administrators are over zealous. Cities within a county should be responsible to that county and state regulations. Watershed districts have overlapped each other or better yet just over populated to charge fees. Example: Rice Creek Watershed 1945 area is now divided into several. Yet Mississippi & St. Croix rivers still collect its run-off. I've lived and witnessed.

- Many neighbors have lawns or rip-raps. I'd like to see a tax benefit to natural buffers. Maybe a benefit of shoreline x buffer depth in $. More education of shoreline owners. List of "approved vendors" for lawn services & lake weed treatments.

- Puzzling thing is I think we have all heard about maintaining some natural habitat along edges of water to help detox and provide some habitat – yet, above half the owners still mow right to the water edge and still apply lawn chemicals similarly – right along the water. Weird!

- If regulation requires homeowners to mitigate, it would be very difficult to do without monetary and technical support.

- Beaver lake has improved immensely as a result of the Ramsey county engineers. Dean Anklan increased water level & dredges the St. Paul side. The dike holding the refuse broke terminating the project. Open space reduced. Landowners improved lakeshore. Sewage was terminated! The construction of a path around the lake has vastly increased lake use. We have a year round stream of walkers, bikers, runners, wheel chairs, baby buggies, etc. – travel is extensive & very-very valuable to a large area of users. Wildlife is proliferating – too many deer – vast numbers of honkers & other birds. Let's not forget that the county manifests & sustains a fish population – also a fishing dock. Congratulations again to Dean Anklan & the county engineers.

- You should define better the team "wetlands adjacent lakes." For the lay person, it sounds as if it is more technical than it appears.

Appendix 5: Draft of Proposed MN DNR Shoreland Rules dated July 6, 2010

Attached as separate pdf file to this report: rd3879DRAFT20100706.pdf